Free Signal Located

Jiadi Yu,Hao Kong,Linghe Kong

Digital Alias-free Signal Processing Ivars Bilinskis,2007-09-27 As demand for applications working in extended frequency ranges increases, classical Digital signal processing (DSP) techniques, not protected against aliasing, are becoming less effective. Digital alias-free signal processing (DASP) is a technique for overcoming the problems of aliasing at extended frequency ranges. Based on non-uniform or randomised sampling techniques and the development of novel algorithms, it creates the capacity to suppress potential aliasing crucial for high frequency applications and to reduce the complexity of designs. This book provides practical and comprehensive coverage of the theory and techniques behind alias-free digital signal processing. Key features: Analyses issues of sampling, randomised and pseudo-randomised quantisation and direct and indirectly randomised sampling. Examines periodic and hybrid sampling, including information on processing algorithms and potential limitations imposed by signal dynamics. Sets out leading methods and techniques for complexity reduced designs, in particular designs of large aperture sensor arrays, massive data acquisition and compression from a number of signal sources and complexity-reduced processing of non-uniform data. Presents examples of engineering applications using these techniques including spectrum analysis, waveform reconstruction and the estimation of various parameters, emphasising the importance of the technique for developing new technologies. Links DASP and traditional technologies by mapping them into embedded systems with standard inputs and outputs. Digital Alias-free Signal Processing is ideal for practising engineers and researchers working on the development of digital signal processing applications at extended frequencies. It is also a valuable reference for electrical and computer engineering graduates taking courses in signal processing or digital signal processing.

WiFi signal-based user authentication Jiadi Yu,Hao Kong,Linghe

Kong,2023-10-16 As a privacy-preserving and illumination-robust manner, WiFi signal-based user authentication has become a new direction for ubiquitous user authentication to protect user privacy and security. It gradually turns into an important option for addressing the security concern of IoT environment. However, due to the limited sensing capability of WiFi signals and wide application scenarios, WiFi signal-based user authentication suffers from practical issues of diversified behaviors and complex scenarios. Therefore, it is necessary to address the issues and build integrated systems for user authentication using WiFi signals. In this book, the development and progress of WiFi signal-based user authentication systems in extensive scenarios are presented, which provides a new direction and solution for ubiquitous security and privacy protection. This book gives strong motivation of leveraging WiFi signals to sense human activities for user authentication, and presents the key issues of WiFi-based user authentication in diversified behaviors and complex scenarios. This book provides the approaches for digging WiFi signals to sense human activities and extract features, realizing user authentication under fine-grained finger gestures, undefined body gestures, and multi-user scenarios. State-of-the-art researches and future directions involved with WiFi signal-based user authentication are presented and discussed as well. This book will benefit researchers and practitioners in the related field.

ECG Signal Processing, Classification and Interpretation Adam Gacek,Witold Pedrycz,2011-09-18 The book shows how the various paradigms of computational intelligence, employed either singly or in combination, can produce an effective structure for obtaining often vital information from ECG signals. The text is self-contained, addressing concepts, methodology, algorithms, and case studies and applications, providing the reader with the necessary background augmented with step-by-step explanation of the more advanced concepts. It is structured in three parts: Part I covers the fundamental ideas of computational intelligence

together with the relevant principles of data acquisition, morphology and use in diagnosis; Part II deals with techniques and models of computational intelligence that are suitable for signal processing; and Part III details ECG system-diagnostic interpretation and knowledge acquisition architectures. Illustrative material includes: brief numerical experiments; detailed schemes, exercises and more advanced problems.

Railway Signal Engineer ,1917

Communications, Signal Processing, and Systems Qilian Liang,Xin Liu,Zhenyu Na,Wei Wang,Jiasong Mu,Baoju Zhang,2019-08-14 This book brings together papers from the 2018 International Conference on Communications, Signal Processing, and Systems, which was held in Dalian, China on July 14–16, 2018. Presenting the latest developments and discussing the interactions and links between these multidisciplinary fields, the book spans topics ranging from communications, signal processing and systems. It is aimed at undergraduate and graduate electrical engineering, computer science and mathematics students, researchers and engineers from academia and industry as well as government employees.

Model Based Signal Enhancement for Impulse Response Measurement Xun Wang,2014-02-10 Impulse response measurements that are performed outdoors are highly susceptible to the uncertainties caused by the non-perfect measurement setup, the presence of background noise, and fluctuations in media such as wind and temperature drift. This work concentrates on two scenarios: the measurement of reflection coefficients of noise barriers and the influence of temperature variances in machinery cavities. Regarding the sound barrier measurement outdoors, a linear four-microphone array can be used to separate direct sound and reflected sound if the sound barrier does not include complicated scattering structures. With regard to the impulse response of an air-borne sound measurement for a machine monitoring system, a time-warping model for inter-period

and intra-period temperature variances is investigated.

Model-Based Signal Processing James V. Candy,2005-10-27 A unique treatment of signal processing using a model-basedperspective Signal processing is primarily aimed at extracting usefulinformation, while rejecting the extraneous from noisy data. Ifsignal levels are high, then basic techniques can be applied.However, low signal levels require using the underlying physics tocorrect the problem causing these low levels and extracting thedesired information. Model-based signal processing incorporates thephysical phenomena, measurements, and noise in the form ofmathematical models to solve this problem. Not only does theapproach enable signal processors to work directly in terms of theproblem's physics, instrumentation, and uncertainties, but itprovides far superior performance over the standard techniques.Model-based signal processing is both a modeler's as well as asignal processor's tool. Model-Based Signal Processing develops the model-based approach ina unified manner and follows it through the text in the algorithms,examples, applications, and case studies. The approach, coupledwith the hierarchy of physics-based models that the authordevelops, including linear as well as nonlinear representations,makes it a unique contribution to the field of signalprocessing. The text includes parametric (e.g., autoregressive or all-pole),sinusoidal, wave-based, and state-space models as some of the modelsets with its focus on how they may be used to solve signalprocessing problems. Special features are provided that assistreaders in understanding the material and learning how to applytheir new knowledge to solving real-life problems. * Unified treatment of well-known signal processing modelsincluding physics-based model sets * Simple applications demonstrate how the model-based approachworks, while detailed case studies demonstrate problem solutions intheir entirety from concept to model development, throughsimulation, application to real data, and detailed performanceanalysis * Summaries provided with each

chapter ensure that readersunderstand the key points needed to move forward in the text aswell as MATLAB(r) Notes that describe the key commands andtoolboxes readily available to perform the algorithmsdiscussed * References lead to more in-depth coverage of specializedtopics * Problem sets test readers' knowledge and help them put their newskills into practice The author demonstrates how the basic idea of model-based signalprocessing is a highly effective and natural way to solve bothbasic as well as complex processing problems. Designed as agraduate-level text, this book is also essential reading forpracticing signal-processing professionals and scientists, who willfind the variety of case studies to be invaluable. An Instructor's Manual presenting detailed solutions to all theproblems in the book is available from the Wiley editorialdepartment

Location Management and Routing in Mobile Wireless Networks Amitava Mukherjee,Somprakash Bandyopadhyay,Debashis Saha,2003 As wireless users have become increasingly mobile, tracking their location and establishing communications links between them have become critical. Location management, paging and routing are the key technologies for performing these crucial functions. This comprehensive work examines past, present and future advances in location management and routing protocols for both single-hop and multi-hop mobile wireless networks.

Injection-Locking in Mixed-Mode Signal Processing Fei Yuan,2019-05-17 This book provides readers with a comprehensive treatment of the principles, circuit design techniques, and applications of injection-locking in mixed-mode signal processing, with an emphasis on CMOS implementation. Major topics include: An overview of injection-locking, the principle of injection-locking in harmonic and non-harmonic oscillators, lock range enhancement techniques for harmonic oscillators, lock range enhancement techniques for non-harmonic oscillators, and the emerging applications of injection-locking in mixed-mode

signal processing. Provides a single-source reference to the principles, circuit design techniques, and applications of injection-locking in mixed-mode signal processing; Includes a rich collection of design techniques for increasing the lock range of oscillators under injection, along with in-depth examination of the pros and cons of these methods; Enables a broad range of applications, such as passive wireless microsystems, forwarded-clock parallel data links, frequency synthesizers for wireless and wireline communications, and low phase noise phase-locked loops.

Proceedings of the Association of North American Railroad Superintendents American Society of Railroad Superintendents,1897

Event-Based Control and Signal Processing Marek Miskowicz,2018-09-03 Event-based systems are a class of reactive systems deployed in a wide spectrum of engineering disciplines including control, communication, signal processing, and electronic instrumentation. Activities in event-based systems are triggered in response to events usually representing a significant change of the state of controlled or monitored physical variables. Event-based systems adopt a model of calls for resources only if it is necessary, and therefore, they are characterized by efficient utilization of communication bandwidth, computation capability, and energy budget. Currently, the economical use of constrained technical resources is a critical issue in various application domains because many systems become increasingly networked, wireless, and spatially distributed. Event-Based Control and Signal Processing examines the event-based paradigm in control, communication, and signal processing, with a focus on implementation in networked sensor and control systems. Featuring 23 chapters contributed by more than 60 leading researchers from around the world, this book covers: Methods of analysis and design of event-based control and signal processing Event-driven control and optimization of hybrid systems Decentralized event-triggered control Periodic event-triggered

control Model-based event-triggered control and event-triggered generalized predictive control Event-based intermittent control in man and machine Event-based PID controllers Event-based state estimation Self-triggered and team-triggered control Event-triggered and time-triggered real-time architectures for embedded systems Event-based continuous-time signal acquisition and DSP Statistical event-based signal processing in distributed detection and estimation Asynchronous spike event coding technique with address event representation Event-based processing of non-stationary signals Event-based digital (FIR and IIR) filters Event-based local bandwidth estimation and signal reconstruction Event-Based Control and Signal Processing is the first extensive study on both event-based control and event-based signal processing, presenting scientific contributions at the cutting edge of modern science and engineering.

 Proceedings of the ... Meeting of the American Society of Railroad Superintendents American Society of Railroad Superintendents,1897

 The Canadian Patent Office Record and Register of Copyrights and Trade Marks ,1923

 Scientific Canadian Mechanics' Magazine and Patent Office Record Canada. Patent Office,1901

 Handbook of Position Location Reza Zekavat,R. Michael Buehrer,2019-03-06 A comprehensive review of position location technology — from fundamental theory to advanced practical applications Positioning systems and location technologies have become significant components of modern life, used in a multitude of areas such as law enforcement and security, road safety and navigation, personnel and object tracking, and many more. Position location systems have greatly reduced societal vulnerabilities and enhanced the quality of life for billions of people around the globe — yet limited resources are available to researchers and students in this important field. The Handbook of Position Location: Theory, Practice, and Advances fills this gap,

providing a comprehensive overview of both fundamental and cutting-edge techniques and introducing practical methods of advanced localization and positioning. Now in its second edition, this handbook offers broad and in-depth coverage of essential topics including Time of Arrival (TOA) and Direction of Arrival (DOA) based positioning, Received Signal Strength (RSS) based positioning, network localization, and others. Topics such as GPS, autonomous vehicle applications, and visible light localization are examined, while major revisions to chapters such as body area network positioning and digital signal processing for GNSS receivers reflect current and emerging advances in the field. This new edition: Presents new and revised chapters on topics including localization error evaluation, Kalman filtering, positioning in inhomogeneous media, and Global Positioning (GPS) in harsh environments Offers MATLAB examples to demonstrate fundamental algorithms for positioning and provides online access to all MATLAB code Allows practicing engineers and graduate students to keep pace with contemporary research and new technologies Contains numerous application-based examples including the application of localization to drone navigation, capsule endoscopy localization, and satellite navigation and localization Reviews unique applications of position location systems, including GNSS and RFID-based localization systems The Handbook of Position Location: Theory, Practice, and Advances is valuable resource for practicing engineers and researchers seeking to keep pace with current developments in the field, graduate students in need of clear and accurate course material, and university instructors teaching the fundamentals of wireless localization.

The Signal Engineer ,1926

Official Gazette of the United States Patent Office USA Patent Office,1915

Cell-Free Massive MIMO Giovanni Interdonato,2020-09-09 The fifth generation of mobile communication systems (5G) is

nowadays a reality. 5G networks are been deployed all over the world, and the first 5G-capable devices (e.g., smartphones, tablets, wearable, etc.) are already commercially available. 5G systems provide unprecedented levels of connectivity and quality of service (QoS) to cope with the incessant growth in the number of connected devices and the huge increase in data-rate demand. Massive MIMO (multiple-input multiple-output) technology plays a key role in 5G systems. The underlying principle of this technology is the use of a large number of co-located antennas at the base station, which coherently transmit/receive signals to/from multiple users. This signal co-processing at multiple antennas leads to manifold benefits: array gain, spatial diversity and spatial user multiplexing. These elements enable to meet the QoS requirements established for the 5G systems. The major bottleneck of massive MIMO systems as well as of any cellular network is the inter-cell interference, which affects significantly the cell-edge users, whose performance is already degraded by the path attenuation. To overcome these limitations and provide uniformly excellent service to all the users we need a more radical approach: we need to challenge the cellular paradigm. In this regard, cell-free massive MIMO constitutes the paradigm shift. In the cell-free paradigm, it is not the base station surrounded by the users, but rather it is each user being surrounded by smaller, simpler, serving base stations referred to as access points (APs). In such a system, each user experiences being in the cell-center, and it does not experience any cell boundaries. Hence, the terminology cell-free. As a result, users are not affected by inter-cell interference, and the path attenuation is significantly reduced due to the presence of many APs in their proximity. This leads to impressive performance. Although appealing from the performance viewpoint, the designing and implementation of such a distributed massive MIMO system is a challenging task, and it is the object of this thesis. More specifically, in this thesis we study: Paper A) The large potential of this promising technology in

realistic indoor/outdoor scenarios while also addressing practical deployment issues, such as clock synchronization among APs, and cost-efficient implementations. We provide an extensive description of a cell-free massive MIMO system, emphasizing strengths and weaknesses, and pointing out differences and similarities with existing distributed multiple antenna systems, such as Coordinated MultiPoint (CoMP). Paper B) How to preserve the scalability of the system, by proposing a solution related to data processing, network topology and power control. We consider a realistic scenario where multiple central processing units serve disjoint subsets of APs, and compare the spectral efficiency provided by the proposed scalable framework with the canonical cell-free massive MIMO and CoMP. Paper C) How to improve the spectral efficiency (SE) in the downlink (DL), by devising two distributed precoding schemes, referred to as local partial zero-forcing (ZF) and local protective partial ZF, that provide an adaptable trade-off between interference cancelation and boosting of the desired signal, with no additional front-haul overhead, and that are implementable by APs with very few antennas. We derive closed-form expressions for the achievable SE under the assumption of independent Rayleigh fading channel, channel estimation error and pilot contamination. These closed-form expressions are then used to devise optimal max-min fairness power control. Paper D) How to further improve the SE by letting the user estimate the DL channel from DL pilots, instead of relying solely on the knowledge of the channel statistics. We derive an approximate closed-form expression of the DL SE for conjugate beamforming (CB), and assuming independent Rayleigh fading. This expression accounts for beamformed DL pilots, estimation errors and pilot contamination at both the AP and the user side. We devise a sequential convex approximation algorithm to globally solve the max-min fairness power control optimization problem, and a greedy algorithm for uplink (UL) and DL pilot assignment. The latter consists in jointly selecting the UL and DL

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pilot pair, for each user, that maximizes the smallest SE in the network. Paper E) A precoding scheme that is more suitable when only the channel statistics are available at the users, referred to as enhanced normalized CB. It consists in normalizing the precoding vector by its squared norm in order to reduce the fluctuations of the effective channel seen at the user, and thereby to boost the channel hardening. The performance achieved by this scheme is compared with the CB scheme with DL training (described in Paper D). Paper F) A maximum-likelihood-based method to estimate the channel statistics in the UL, along with an accompanying pilot transmission scheme, that is particularly useful in line-of-sight operation and in scenarios with resource constraints. Pilots are structurally phase-rotated over different coherence blocks to create an effective statistical distribution of the received pilot signal that can be efficiently exploited by the AP when performing the proposed estimation method. The overall conclusion is that cell-free massive MIMO is not a utopia, and a practical, distributed, scalable, high-performance system can be implemented. Today it represents a hot research topic, but tomorrow it might represent a key enabler for beyond-5G technology, as massive MIMO has been for 5G. La quinta generazione dei sistemi radiomobili cellulari (5G) è oggi una realtà. Le reti 5G si stanno diffondendo in tutto il mondo e i dispositivi 5G (ad esempio smartphones, tablets, indossabili, ecc.) sono già disponibili sul mercato. I sistemi 5G garantiscono livelli di connettività e di qualità di servizio senza precedenti, per fronteggiare l'incessante crescita del numero di dispositivi connessi alla rete e della domanda di dati ad alta velocità. La tecnologia Massive MIMO (multiple-input multiple-output) riveste un ruolo fondamentale nei sistemi 5G. Il principio alla base di questa tecnologia è l'impiego di un elevato numero di antenne collocate nella base station (stazione radio base) le quali trasmettono/ricevono segnali, in maniere coerente, a/da più terminali utente. Questo co-processamento del segnale da parte di più antenne apporta molteplici benefici: guadagno di array,

diversità spaziale e multiplazione degli utenti nel dominio spaziale. Questi elementi consentono di raggiungere i requisiti di servizio stabiliti per i sistemi 5G. Tuttavia, il limite principale dei sistemi massive MIMO, così come di ogni rete cellulare, è rappresentato dalla interferenza inter-cella (ovvero l'interferenza tra aree di copertura gestite da diverse base stations), la quale riduce in modo significativo le performance degli utenti a bordo cella, già degradate dalle attenuazioni del segnale dovute alla considerevole distanza dalla base station. Per superare queste limitazioni e fornire una qualità del servizio uniformemente eccellente a tutti gli utenti, è necessario un approccio più radicale e guardare oltre il classico paradigma cellulare che caratterizza le attuali architetture di rete. A tal proposito, cell-free massive MIMO (massive MIMO senza celle) costituisce un cambio di paradigma: ogni utente è circondato e servito contemporaneamente da numerose, semplici e di dimensioni ridotte base stations, denominate access points (punti di accesso alla rete). Gli access points cooperano per servire tutti gli utenti nella loro area di copertura congiunta, eliminando l'interferenza inter-cella e il concetto stesso di cella. Non risentendo più dell'effetto "bordo-cella", gli utenti possono usufruire di qualità di servizio e velocità dati eccellenti. Sebbene attraente dal punto di vista delle performance, l'implementazione di un tale sistema distribuito è una operazione impegnativa ed è oggetto di questa tesi. Piu specificatamente, questa tesi di dottorato tratta: Articolo A) L'enorme potenziale di questa promettente tecnologia in scenari realistici sia indoor che outdoor, proponendo anche delle soluzioni di implementazione flessibili ed a basso costo. Articolo B) Come preservare la scalabilità del sistema, proponendo soluzioni distribuite riguardanti il processamento e la condivisione dei dati, l'architettura di rete e l'allocazione di potenza, ovvero come ottimizzare i livelli di potenza trasmessa dagli access points per ridurre l'interferenza tra utenti e migliorare le performance. Articolo C) Come migliorare l'efficienza spettrale in downlink (da access point verso utente)

proponendo due schemi di pre-codifica dei dati di trasmissione, denominati local partial zero-forcing (ZF) e local protective partial ZF, che forniscono un perfetto compromesso tra cancellazione dell'interferenza tra utenti ed amplificazione del segnale desiderato. Articolo D) Come migliorare l'efficienza spettrale in downlink permettendo al terminale utente di stimare le informazioni sulle condizioni istantanee del canale da sequenze pilota, piuttosto che basarsi su informazioni statistiche ed a lungo termine, come convenzionalmente previsto. Articolo E) In alternativa alla soluzione precedente, uno schema di pre-codifica che è più adatto al caso in cui gli utenti hanno a disposizione esclusivamente informazioni statistiche sul canale per poter effettuare la decodifica dei dati. Articolo F) Un metodo per permettere agli access points di stimare, in maniera rapida, le condizioni di canale su base statistica, favorito da uno schema di trasmissione delle sequenze pilota basato su rotazione di fase. Realizzare un sistema cell-free massive MIMO pratico, distribuito, scalabile e performante non è una utopia. Oggi questo concept rappresenta un argomento di ricerca interessante, attraente e stimolante ma in futuro potrebbe costituire un fattore chiave per le tecnologie post-5G, proprio come massive MIMO lo è stato per il 5G. Den femte generationens mobilkommunikationssystem (5G) är numera en verklighet. 5G-nätverk är utplacerade på ett flertal platser världen över och de första 5G-kapabla terminalerna (såsom smarta telefoner, surfplattor, kroppsburna apparater, etc.) är redan kommersiellt tillgängliga. 5G-systemen kan tillhandahålla tidigare oöverträffade nivåer av uppkoppling och servicekvalitet och är designade för en fortsatt oavbruten tillväxt i antalet uppkopplade apparater och ökande datataktskrav. Massiv MIMO-teknologi (eng: multiple-input multiple-output) spelar en nyckelroll i dagens 5G-system. Principen bakom denna teknik är användningen av ett stort antal samlokaliserade antenner vid basstationen, där alla antennerna sänder och tar emot signaler faskoherent till och från flera användare. Gemensam

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signalbehandling av många antennsignaler ger ett flertal fördelar, såsom hög riktverkan via lobformning, vilket leder till högre datatakter samt möjliggör att flera användare utnyttjar samma radioresurser via rumslig användarmultiplexering. Eftersom en signal kan gå genom flera olika, möjligen oberoende kanaler, så utsätts den för flera olika förändringar samtidigt. Denna mångfald ökar kvaliteten på signalen vid mottagaren och förbättrar radiolänkens robusthet och tillförlitlighet. Detta gör det möjligt att uppfylla de höga kraven på servicekvalitet som fastställts för 5G-systemen. Den största begränsningen för massiva MIMO-system såväl som för alla cellulära mobilnätverk, är störningar från andra celler som påverkar användare på cellkanten väsentligt, vars prestanda redan begränsas av sträckdämpningen på radiokanalen. För att övervinna dessa begränsningar och för att kunna tillhandahålla samma utmärkta servicekvalitet till alla användare behöver vi ett mer radikalt angreppssätt: vi måste utmana cellparadigmet. I detta avseende utgör cellfri massiv-MIMO teknik ett paradigmskifte. I cellfri massive-MIMO är utgångspunkten inte att basstationen är omgiven av användare som den betjänar, utan snarare att varje användare omges av basstationer som de betjänas av. Dessa basstationer, ofta mindre och enklare, kallas accesspunkter (AP). I ett sådant system upplever varje användare att den befinner sig i centrum av systemet och ingen användare upplever några cellgränser. Därav terminologin cellfri. Som ett resultat av detta påverkas inte användarna av inter-cellstörningar och sträckdämpningen reduceras kraftigt på grund av närvaron av många accesspunkter i varje användares närhet. Detta leder till imponerande prestanda. Även om det är tilltalande ur ett prestandaperspektiv så är utformningen och implementeringen av ett sådant distribuerat massivt MIMO-system en utmanande uppgift, och det är syftet med denna avhandling att studera detta. Mer specifikt studerar vi i denna avhandling: A) den mycket stora potentialen med denna teknik i realistiska inomhus- såväl som utomhusscenarier, samt hur man hanterar praktiska

implementeringsproblem, såsom klocksynkronisering bland accesspunkter och kostnadseffektiva implementeringar; B) hur man ska uppnå skalbarhet i systemet genom att föreslå lösningar relaterade till databehandling, nätverkstopologi och effektkontroll; C) hur man ökar datahastigheten i nedlänken med hjälp av två nyutvecklade distribuerade överföringsmetoder som tillhandahåller en avvägning mellan störningsundertryckning och förstärkning av önskade signaler, utan att öka mängden intern signalering till de distribuerade accesspunkterna, och som kan implementeras i accesspunkter med mycket få antenner; D) hur man kan förbättra prestandan ytterligare genom att låta användaren estimera nedlänkskanalen med hjälp av nedlänkspiloter, istället för att bara förlita sig på kunskap om kanalstatistik; E) en överföringsmetod för nedlänk som är mer lämpligt när endast kanalstatistiken är tillgänglig för användarna. Prestandan som uppnås genom detta schema jämförs med en utökad variant av den nedlänk-pilotbaserade metoden (beskrivet i föregående punkt); F) en metod för att uppskatta kanalstatistiken i upplänken, samt en åtföljande pilotsändningsmetod, som är särskilt användbart vid direktvägsutbredning (line-of-sight) och i scenarier med resursbegränsningar. Den övergripande slutsatsen är att cellfri massiv MIMO inte är en utopi, och att ett distribuerat, skalbart, samt högpresterande system kan implementeras praktiskt. Idag representerar detta ett hett forskningsämne, men snart kan det visa sig vara en viktig möjliggörare för teknik bortom dagens system, på samma sätt som centraliserad massiv MIMO har varit för de nya 5G-systemen.

New Spectral Methods for Analysis of Source/filter Characteristics of Speech Signals Baris Bozkurt,Similar,2006 This study proposes a new spectral representation called the Zeros of Z-Transform (ZZT), which is an all-zero representation of the z-transform of the signal. In addition, new chirp group delay processing techniques are developed for analysis of resonances of a signal. The combination of the ZZT representation with the chirp

group delay processing algorithms provides a useful domain to study resonance characteristics of source and filter components of speech. Using the two representations, effective algorithms are developed for: source-tract decomposition of speech, glottal flow parameter estimation, formant tracking and feature extraction for speech recognition. The ZZT representation is mainly important for theoretical studies. Studying the ZZT of a signal is essential to be able to develop effective chirp group delay processing methods. Therefore, first the ZZT representation of the source-filter model of speech is studied for providing a theoretical background. We confirm through ZZT representation that anti-causality of the glottal flow signal introduces mixed-phase characteristics in speech signals. The ZZT of windowed speech signals is also studied since windowing cannot be avoided in practical signal processing algorithms and the effect of windowing on ZZT representation is drastic. We show that separate patterns exist in ZZT representations of windowed speech signals for the glottal flow and the vocal tract contributions. A decomposition method for source-tract separation is developed based on these patterns in ZZT. We define chirp group delay as group delay calculated on a circle other than the unit circle in z-plane. The need to compute group delay on a circle other than the unit circle comes from the fact that group delay spectra are often very noisy and cannot be easily processed for formant tracking purposes (the reasons are explained through ZZT representation). In this thesis, we propose methods to avoid such problems by modifying the ZZT of a signal and further computing the chirp group delay spectrum. New algorithms based on processing of the chirp group delay spectrum are developed for formant tracking and feature estimation for speech recognition. The proposed algorithms are compared to state-of-the-art techniques. Equivalent or higher efficiency is obtained for all proposed algorithms. The theoretical parts of the thesis further discuss a mixed-phase model for speech and phase processing problems in detail. Index Terms—spectral

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representation, source-filter separation, glottal flow estimation, formant tracking, zeros of z-transform, group delay processing, phase processing.

Official Gazette of the United States Patent Office United States. Patent Office,1967

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Free Signal Located Introduction

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