Proceedings
of the
1998 Conference
on
Information Sciences and Systems

Volume I

Department of Electrical Engineering
Princeton University
Princeton, New Jersey 08544-5263
# TABLE OF CONTENTS

**WA-1 Wireless 1**
Chair: Urbashi Mitra, The Ohio State University

*Sequence Estimation in GSM Using the EM Algorithm, Linda M. Zeger, Hisashi Kobayashi* .............................................. 1

*Maximum Likelihood Multipath Channel Parameter Estimation in CDMA Systems, Chaitali Sengupta, Ari Hottinen, Joseph R. Cavallaro, Behnaam Aazhang* .............................................. 6

*Space-Time Power Allocation in CDMA Networks, Tiina Heikkinen, Ari Hottinen* .............................................. 12

*Multiuser Access Detection for CDMA Systems, Aylin Yener, Roy D. Yates* .............................................. 17

*Multi-Shot Detection for Asynchronous Multi-Rate CDMA Systems, Jinwen Ma, Hongya Ge* .............................................. 23

*Power Allocation and Control for Multi-Carrier Systems with Soft Decoding, Hsuan-Jung Su, Evaggelos Geraniotis* .............................................. 29

**WA-2 Control 1**
Chair: Zoran Gajić, Rutgers University

*Application of Differential Game to Optimal Marketing Strategies with Heterogeneous Capital Goods, Marshall C.Y. Kuo* .............................................. 36

*An Application of Razumikhin Results for Systems of Delay Difference Equations, A.S.C. Sinha* .............................................. 41

*Control Issues in Teleoperations with Communication Time Delays, Minyan Shi, J. Hunter Downs, Gang Tao, Sean Graves* .............................................. 46

*Efficient Implementation of Controllers for Large Scale Linear Systems via Wavelet Packet Transforms, George A. Kantor, P.S. Krishnaprasad* .............................................. 52

**WA-3 Time Frequency**
John Sadowsky, Johns Hopkins Applied Physics Lab


*Adaptive-Time Frequency Subspace Detection in Subspace Interference, Nigel Lee, John Impagliazzo* .............................................. 59

*Multi-Gabor Representations with Nonuniform Time and Frequency Shifts and Applications, Shidong Li* .............................................. 65

*Wavelet Expansions of Volterra Systems, George A. Tsihrintzis* .............................................. 71

*Scale-Based Optimal Discrete-Time Orthonormal Wavelets, Ravindra Peravali, Joel M. Morris* .............................................. 75

*Adaptive Design of Wavelets for Continuous and Discrete Wavelet Transforms to Determine Features in Signals, John Sadowsky* .............................................. 77
WA-4 Distributed Detection
Chair: Rick S. Blum, Lehigh University

Distributed Detection with Multiple Local Free Parameters, Fulvio Gini, Fabrizio Lombrardini, Pramod K. Varshney, Lucio Verrazzani..........................................................79

Distributed Detection of Rayleigh Target in Weibull Clutter, Chandrakanth H. Gowda, R. Viswanathan.. ...............................................................85

Distributed Detection Using the MLGDS Test, Li Bai, Moshe Kam..........................................................91

Distributed Traffic Monitoring and Learning for ATM Networks, Anthony T. Burrell, P. Papantoni-Kazakos.................................................................................97

Distributed Detection of BFSK Frequency Hopped Signals with Fading and Additive Gaussian Noise, Hussein K. Mecklai, Rick S. Blum.........................................................101

M-ary Hypothesis Testing with Binary Local Decisions, Xiaoxun Zhu, Moshe Kam, Chris Rorres......107

WA-5 CDMA
Chair: Costas Georgiades, Texas A&M University

Performance of Frequency Hopping CDMA System with Trellis Coding, Aleksandar V. Jovančević, Edward L. Titlebaum..........................................................113

Weighting Effects on the Traceability of Frequency Hopped CDMA Signals, Lisa Ann Osadciw, Edward L. Titlebaum..........................................................117

Probability of Bit Error in a Power Controlled Cellular CDMA System with Space Diversity, Weichen Ye, Alexander M. Haimovich..........................................................123

Spectrum Control in a Wideband SS-CDMA System under Narrowband Interference, P. Spasojević, C.N. Georgiades..........................................................129

Coding-Spreading Trade-off in DS/CDMA Successive Interference Cancellation, Aleksandar D. Damnjanovic, Branimir R. Vojcic..........................................................135

Multiple-Access Interference Resistant Acquisition for CDMA Systems with Long Spreading Sequences, Ashok Mantravadi, Venugopal V. Veeravalli..........................................................141

WP-1 Wireless 2
Chair: Raymond L. Pickholtz, George Washington University

Pilot Symbol Assisted Modulation for OFDM, Selaka B. Bulumulla, Saleem A. Kassam, Santosh S. Venkatesh..........................................................147

A Constrained Adaptive Beamforming Algorithm for Cochannel GSM Signals, Rajiv Chandrasekaran, John J. Shynk..........................................................152

Effects of Multipath Interference on Non-Coherent Detection of GMSK Signals, Pei Chen, Hisashi Kobayashi..........................................................158

Frequency-based Rate Separation for Dual-rate CDMA Signals, Radha Srinivasan, Urbashi Mitra, Randolph L. Moses..........................................................163
Transmitter-Based Multiuser Interference Rejection for Synchronous CDMA Systems in Multipath Environments, Anupama Dharap, Maité Brandt-Pearce ................................................................. 169

A Novel Precoding Method for Blind Symbol Detection Over Frequency-Selective Channels, Kemin Li, Hui Liu .................................................................................................................. 175

A QoS Based Adaptive Power Control Algorithm for the CDMA Forward Link, Lei Song, Narayan B. Mandayam .............................................................................................................. 180

WP-2 Communication Networks
Chair: Ammar Rayes, Bellcore

Concurrent Communication in Ring Networks, Michael R. Henry, Charles B. Silio, Jr., A. Brinton Cooper III .............................................................. 182

An Analysis of Traffic Clipping, R.L. Cruz, M. Taneja .................................................................................................................................................. 188

A Hybrid Analytical/Measurement-Based Decision-Making Approach to Connection Admission Control, Michael Cheung, Jon W. Mark ........................................................................ 194

Dynamic Pricing and Power Control of a Multi-Media Network, Tiina Heikkinen ................................................................................................................ 200

Assignment Strategies for Delay Guarantees Over a Multiple Link Packet Switched System, Yanfeng Wang, Galen Sasaki, Yao-Min Chen ........................................................................... 205

Performance of Rate Control Multipoint Routing Algorithm in Broadband Networks, A.S. Maunder, A. Rayes, P.S. Min .................................................................................................... 211

Throughput Distribution of a Discrete-Time Packet Switch, Murat Azizolgu, James A. Ritcey .............................................................................................. 217

WP-3 Multiuser Detection
Chair: Stefan Parkvall, University of California, San Diego

Multiuser Detection for CDMA Applications Using a Hopfield Neural Network, Chandrasekar Sankaran, Anthony Ephremides .................................................................................. 219

Projection Interpretation on Linear Multiuser Detectors, Hongya Ge ................................................................................................................................. 225

Noncoherent Decision Feedback Multiuser Detection for Nonorthogonal Multipulse Modulation, Mahesh K. Varanasi, Deepak Das .................................................................................. 230

A Systematic Approach to Noncoherent Detection for DPSK Modulation in Multiuser Correlated Diversity Rayleigh Fading Channels, Mahesh K. Varanasi, Matthias Brehler ......................................................................................... 236

A Software Radio Architecture for Linear Multiuser Detection, Ivan Seskar, Narayan B. Mandayam ..242

On the Performance Difference Between Long and Short Spreading Codes in DS-CDMA Systems, Stefan Parkvall .............................................................................................................. 248

WP-4 Image Processing
Chair: Shang-Hong Lai, Siemens

Biometric Identification by Palmprint, Wei Shu, Dapeng Zhang ................................................................................................................................. 254

Nonlinear Image Decomposition for Multiresolution Edge Detection, Junaid I. Siddique, Kenneth E. Barner .............................................................................................................. 259
Computer Vision Algorithms for the Separation of Debris Particles from Multiple Overlapping Bubbles, Abraham Schultz, Chao Lu, John F. Reintjes

An Iterative Linear Unmixing Kalman Filtering Approach to Detection and Estimation for Signature Abundance in Remotely Sensed Imagery, Clark Brumbley, Chein-I Chang

An Edge-Sensitive Technique Using the Discrete Wavelet Transform for Image Denoising, Jason E. Piatt, Maurice F. Aburdene

Two-dimensional Sequence Estimation By Viterbi-like Algorithms, Raghuraman Krishnamaoorthi, Richard E. Blahut

WP-5 Control 2
Chair: Minh Phan, Princeton University

On the Stability of Frozen Time $\mathcal{H}_\infty$ Controllers, Pablo A. Iglesias

Gain/Phase Margin Improvement Using Low Order Linear Periodic Controllers, Mauro Rossi, Daniel E. Miller

Cheap Control of Sampled Data Systems: A Singular Perturbation Approach, Dimitrie C. Popescu, Zoran Gajić

Gain Scheduling with H-infinity Controllers, Daniel J. Stillwell, Wilson J. Rugh

Frequency Response Based Convergence of Learning/Repetitive Controllers for Nonlinear Systems, Richard W. Longman, Chun-Ping Lo

Adaptive Control of Multivariable Systems with Actuator Nonlinearities, Yi Ling, Gang Tao

TA-1 Signal and Image Coding
Chair: Mike Orchard, Princeton University

Transmission of Compressed Images over Noisy Channels using Incremental Precision and Incremental Redundancy, Chao-Hwa Chen, Thomas E. Fuja

Reconstruction of Block Errors in MPEG-4 Coded Video, A. Kopansky, M. Bystrom


Redundancy Rate-Distortion Optimal Orthonormal Filter Banks for Multiple Description Coding, Xuguang Yang, Kannan Ramchandran

Asymptotic Performance of Subband Coders Using Constrained, Signal-Adapted FIR Filter Banks, Pierre Moulin, Mihai Anitescu, Kannan Ramchandran

TA-2 Wireless Networks 1
Chair: Krishna Balachandran, Lucent Technologies

Multibeam Cellular Communication Systems with Dynamic Channel Assignment across Multiple Sectors, Jung-Lin Pan, Stephen S. Rappaport, Petar M. Djuric

Information Delivery in Two-stage Satellite-Terrestrial Wireless Systems, Özgür Erçetin, Leandros Tassiulas

Stability of Wireless Networks for Mode S Radar, Jay P. Chawla, Steven I. Marcus, Mark A. Shayman


TA-3 Estimation 1
Chair: Lang Tong, University of Connecticut

A Tuner that Accelerates Parameters, Felipe M. Pait, Paulo A. Atkinson

A General Class of Nonlinear Normalized LMS-type Adaptive Algorithms, Sudhakar Kalluri, Gonzalo R. Arce

Low-Complexity and Low-Variance Estimation of Bandlimited Systems Based on the Trispectrum Slices, Haralambos Pozidis, Athina P. Petropulu

Geometrical Characterizations of Constant Modulus Receivers, Ming Gu, Lang Tong

PAC Learning Open Intervals with Side Information, Pirkko Kuusela, Daniel Ocone

On Universal Estimation, Charles G. Boncelet

TA-4 LMI Methods in Signal Processing
Chair: Jeffrey O. Coleman, Naval Research Laboratory

Linear Matrix Inequalities for Signal Processing, An Overview, V. Balakrishnan, L. Vandenberghe

FIR Filter Design via Spectral Factorization and Convex Optimization, Shao-Po Wu, Stephen Boyd, Lieven Vandenberghe

Systematic Mapping of Quadratic Constraints on Embedded FIR Filters to Linear Matrix Inequalities, Jeffrey O. Coleman

Constrained Quadratic Design of FIR Data-Communication Filters with Linear Matrix Inequalities, Dan P. Scholnik, Jeffrey O. Coleman

TA-5 Coding
Chair: John Anderson, Rensselaer Polytechnic Institute

On the Convergence of Iterative Decoding on Graphs with a Single Cycle, Srinivas M. Aji, Gavin B. Horn, Robert J. McEliece

Junction Tree Representations for Linear Block Codes, Robert J. McEliece, Meina Xu

A Condition for Feedback Tailbiting Convolutional Encoders and a Short List of Allowed Feedback Polynomials, Rolf Johannesson, John B. Anderson

From the Sudan Algorithm to the Key Equation, Weishi Feng, R.E. Blahut

Low Complexity ML Decoder for 2nd Order Reed-Muller Codes, Ali S. Khayrallah
Extension of the Conway-Sloane Decoder to Shortened Golay Codes, Ali S. Khayrallah, Raymond L. Toy

A General Class of Error-Detection Codes, Gam D. Nguyen

TA-6 Communications 1
Chair: James Ritchey, University of Washington

Iterative Decoding of GSM Signals, David A. Garr, Jan Bajcsy, Hisashi Kobayashi

Adaptive Algorithms for Symbol Period Estimation, Milos Doroslovački, Lei Yao

Symbol Synchronization for Multichannel Modulation, Fred Daneshgaran, Marina Mondin, Fabio Davis

Bit-Interleaved Coded Modulation with Iterative Decoding - Approaching Turbo-TCM Performance without Code Concatenation, Xiaodong Li, James A. Ritchey

Decoding Entropy-Coded Symbols Over Noisy Channels by MAP Sequence Estimation for Asynchronous HMMs, MoonSeo Park, David J. Miller

OFDM Frequency Offset Correction Using an Adaptive Decorrelator, Matthijs A. Visser, Yeheskel Bar-Ness

TP-1 Turbo Coding
Chair: Yih-Fang Huang, Notre Dame University

Combined Turbo Coding and Turbo Equalization for PR4-Equalized Lorentzian Channels, William E. Ryan, Laura L. McPeters, Steven W. McLaughlin

Turbo Code Performance in Heavy-Tailed Noise, Todd A. Summers, Stephen G. Wilson

Volume II
pages 501-1023

Turbo Coding with 180° Transparency, Stephen G. Wilson, Weixiao Liu, William J. Blackert III

Low Complexity Iterative Interleaver Growth Algorithms for Turbo Codes, Fred Daneshgaran, Marina Mondin

Impact of the Interleaver on Complexity of Turbo Codes, Fred Daneshgaran

Good Interleavers for Concatenated Block Codes, Jan Bajcsy, Hisashi Kobayashi

Turbo Coding for 7-Level and 3-Level Quantized AWGN Channels, Kemal E. Tepe, John B. Anderson

TP-2 Communications 2
Chair: David Miller, Pennsylvania State University

Comparison of Blind Equalization Techniques for Nonlinear Channels, Charles D. Murphy, Saleem A. Kassam

Importance Sampling Technique for Efficient Simulation of a Symbol-by-Symbol TCM Decoding/Equalization Algorithm, Kyeong Jin Kim, Ronald A. ItlIs