SCC 2017

11th International ITG Conference on Systems, Communications and Coding

Proceedings

Monday February 6, 2017

13:30 – 18:30	**Tutorials**

Tuesday February 7, 2017

9:15 – 10:30	**Session 1: Shannon / Network Coding**
10:30 – 11:20	**Poster Session P1**
11:20 – 12:35	**Session 2: Information Theory**
14:00 – 15:35	**Session 3: Cooperative Communications and Computing**
15:35 – 16:25	**Poster Session P2**
16:25 – 18:00	**Session 4: Channel Coding**

Wednesday February 8, 2017

9:00 – 10:30	**Session 5: Industry 4.0 / Industrial Radio**
10:30 – 11:20	**Poster Session P3**
11:20 – 12:40	**Session 6: Secure Communications and Compressed Sensing**
14:00 – 15:45	**Session 7: Localization**
15:45 – 16:25	**Poster Session P4**
16:25 – 17:35	**Session 8: Internet of Things and Video Compression**

Thursday February 9, 2017

9:00 – 10:30	**Session 9: Cellular Systems: 5G and Beyond**
10:30 – 11:20	**Poster Session P5**
11:20 - 12:55	**Session 10: Massive MIMO**
14:00 – 15:30	**Session 11: Fiber-Optical Communications**
16:00 – 17:40	**Session 12: Channel Coding and Modulation**

Session 1: Shannon / Network Coding
Chair: Gerhard Bauch, Hamburg University of Technology

9:15 – 10:30

Invited Talk:
Claude E. Shannon 100th Birthday:
The Founding Father of the Information Age
Joachim Hagenauer, Technische Universität München, Germany

Invited Talk:
BATS: Network Coding in Action
Raymond W. Yeung, The Chinese University of Hong Kong

Poster Session P1
10:30 - 11:20

P1-1
Asymptotically Tight Capacity Bounds for a Class of Memoryless Nonlinear AWGN Channels
Karsten Wiedmann, Tobias Weber, University of Rostock, Germany

P1-2
Mutual Information-Based Clustering: Hard or Soft?
Bernhard C. Geiger, Rana Ali Amjad, Technische Universität München, Germany

P1-3
On the Equivalence Between Classical and Distributional Convergence for Shannon Type Interpolation Series and Applications
Ezra Tampubolon, Holger Boche, Technische Universität München, Germany

P1-4
Structure of Signals and Systems with Non-Convergent Sampling Representation
Ullrich J. Mönich, Holger Boche, Technische Universität München, Germany

P1-5
Achieving Minimum Latency in Relay Assisted Interference Networks
Soheil Gherekhloo, Aydin Sezgin, Ruhr Universität Bochum, Germany

P1-6
Layering of Communication Networks and a Forward-Backward Duality
Michael Cyran, Johannes Huber, University of Erlangen-Nuremberg, Germany
Birgit Schotsch, Airbus Group, Germany
Robert F. H. Fischer, Ulm University, Germany

P1-7
On the Connectivity of Two-Hop Networks in Finite Domains
Dene A. Hedges, Justin P. Coon, University of Oxford, United Kingdom
Orestis Georgiou, Toshiba Telecommunications Research Laboratory, United Kingdom

P1-8
Overview and Investigation of Algorithms for the Information Bottleneck Method
Shayan Hassanpour, Dirk Wübben, Armin Dekorsy, University of Bremen, Germany

P1-9
On the Relationship Between the KL Means Algorithm and the Information Bottleneck Method
Brian Michael Kurkoski, Japan Advanced Institute of Science and Technology (JAIST), Japan

P1-10
Channel Capacity and Optimum Transmission Bandwidth of In-Body Ultra Wideband Communication Links
Jan-Christoph Brumm, Gerhard Bauch, Hamburg University of Technology, Germany

P1-11
Link Analysis Between an Airborne Mobile Station and a Terrestrial GSM Network
Rodrigo Justavino, Rainer Grünheid, Gerhard Bauch, Hamburg University of Technology, Germany
Florian Wolff, Stefan von der Heide, Siemens Convergence Creators, Germany

P1-12
Faster-than-Nyquist Signaling for Satellite Communications: A PAPR Analysis
Thomas Delamotte, Andreas Knopp, University of Federal Armed Forces Munich, Germany
Gerhard Bauch, Hamburg University of Technology, Germany

Session 2: Information Theory
Chair: Gerhard Kramer, Technische Universität München

11:20 – 11:55 **Invited Talk:**
Other Notions of Channel Capacity
Amos Lapidoth, ETH Zurich, Switzerland

11:55 – 12:15 **On the Capacity of Censored Channels**
Arash Behboodi, Gholamreza Alirezaei, Rudolf Mathar, RWTH Aachen University, Germany

12:15 – 12:35 **On the Capacity of Fading Broadcast Channels with Statistical CSIT and Memory**
Pin-Hsun Lin, Eduard Jorswieck, Martin Mittelbach, Dresden University of Technology, Germany
Rafael F. Schaefer, Berlin University of Technology, Germany

Session 3: Cooperative Communications and Computing
Chair: Volker Kühn, University of Rostock

14:00 – 14:35 **Invited Talk:**
Self-Organizing Synchronization in Networked Systems
Christian Bettstetter, University of Klagenfurt, Austria

14:35 – 14:55 **On Compress and Forward with Multiple Carriers in the 3-Node Relay Channel Exploiting Information Bottleneck Graphs**
Daniel Kern, Volker Kuehn, University of Rostock, Germany

14:55 – 15:15 **Cooperative Wireless Backhauling**
Vahid Jamali, Robert Schober, University of Erlangen-Nuremberg, Germany
Nikola Zlatanov, Monash University, Australia

15:15 – 15:35 **Optimal Joint Power Allocation and Task Splitting in Wireless Distributed Computing**
Quy Hong Le, Hussein Al-Shatri, Anja Klein, Technische Universität Darmstadt, Germany

Poster Session P2
15:35 - 16:25

P2-1
Design of Protograph-Based LDPC Code Ensembles with Fast Convergence Properties
Ian P. Mulholland, Mark F. Flanagan, University College Dublin, Ireland
Enrico Paolini, University of Bologna, Italy

P2-2
GLDPC Coded Modulation and Its Squared Euclidean Distance Distribution
Mark F. Flanagan, University College Dublin, Ireland
Gianluigi Liva, German Aerospace Center (DLR), Oberpfaffenhofen, Germany
Enrico Paolini, University of Bologna, Italy

P2-3
Chained Polar Subcodes
Peter Trifonov, Saint-Petersburg State Polytechnic University, Russia

P2-4
On the Performance of Short Tail-Biting Convolutional Codes for Ultra-Reliable Communications
Lorenzo Gaudio, Tudor Ninacs, Thomas Jerkovits, Gianluigi Liva, German Aerospace Center (DLR), Oberpfaffenhofen, Germany

P2-5
Low Complexity ML-Detection of Arbitrary Spherical Codes
Christoph Rachinger, Ralf R. Müller, Johannes B. Huber, University of Erlangen-Nuremberg, Germany

P2-6
Improved Syndrome Decoding of Interleaved Subspace Codes
Hannes Bartz, Manuela Meier, Vladimir Sidorenko, Technische Universität München, Germany

P2-7
Guruswami-Sudan List Decoding for Complex Reed-Solomon Codes
Mostafa H. Mohamed, Sven Puchinger, Martin Bossert, Ulm University, Germany

P2-8
Complexity of Analog Modulo Block Codes
Tim Schmitz, Felix Schäfer, Peter Jax, Peter Vary, RWTH Aachen University, Germany

P2-9
Multi-Track Recording Systems Using Non-binary Error Correction Coding Schemes for Bit-Patterned Magnetic Recording
Hidetoshi Saito, Kogakuin University, Japan

P2-10
A Channel and Source Coding Approach for the Binary Asymmetric Channel with Applications to MLC Flash Memories
Juergen Freudenberger, Mohammed Rajab, University of Applied Sciences, Konstanz, German
Sergo Shavgulidze, Georgian Technical University, Georgia

P2-11
Higher-Order Kullback-Leibler Aggregation of Markov Chains
Bernhard C. Geiger, Yuchen Wu, Technische Universität München, Germany

P2-12
On Spectral Shaping of Multicarrier Waveforms Employing FIR-Filtering and Active Interference Cancellation
Xiaojie Wang, Kevin Kienzle, Stephan ten Brink, University of Stuttgart, Germany

Session 4: Channel Coding
Chair: Martin Bossert, Ulm University

16:25 – 17:00 **Invited Talk:**
The VLSI Energy Cost of Encoding and Decoding
Frank R. Kschischang, University of Toronto, Canada

17:00 – 17:20 **Latency Reduced LTE-A Turbo-Code Decoding with Iteration Balancing on Transport Block Level**
Stefan Weithoffer, Norbert When, University of Kaiserslautern, Germany

17:20 – 17:40 **Feed-Forward Staircase Codes**
Lei Zhang, University of Toronto, Canada
Laurent Schmalen, Nokia Bell Labs, Germany

17:40 – 18:00 **Discrete Channel Estimation by Integer Passing in Information Bottleneck Graphs**
Jan Lewandowsky, Maximilian Stark, Rico Mendrzik, Gerhard Bauch, Hamburg University of Technology, Germany

Session 5: Industry 4.0 / Industrial Radio
Chair: Armin Dekorsy, University of Bremen

9:00 - 9:20 **Introduction to Industrial Radio and Industry 4.0**
Armin Dekorsy, University of Bremen, Germany

9:20 - 9:55 **Invited Talk:**
Security Concepts for the Internet of Things and Industry 4.0
Fabian Mackenthun, NXP Semiconductors GmbH, Germany

9:55 - 10:30 **Invited Talk:**
The Role of Wireless Communication for Industry 4.0
Andreas Mueller, Robert Bosch GmbH, Germany

Poster Session P3
10:30 - 11:20

P3-1
Realizing Pulse-Coupled Oscillators Synchronization on IEEE 802.15.4 Wireless Networks
Wasif Masood, Jorge F. Schmidt, University of Klagenfurt, Austria

P3-2
Single-Receiver Switched Opportunistic Approach to AoA Estimation in Hardware Impaired Scenarios
Andrea Papaiz, University of Udine, Italy
Andrea M. Tonello, University of Klagenfurt, Austria

P3-3
Optimal Factorization in Lattice-Reduction-Aided and Integer-Forcing Linear Equalization
Sebastian Stern, Robert F. H. Fischer, Ulm University, Germany

P3-4
Time-Domain Equalization in Broadband DC-PLC Sensor Networks
Vladimir Burstein, Werner Henkel, Jacobs University Bremen, Germany

P3-5
Low-Effort On-Board Memoryless Predistortion Techniques for SATCOM
Ovais Bin Usman, Thomas Delamotte, Andreas Knopp, University of Federal Armed Forces Munich, Germany

P3-6
Throughput Performance of Time- And Frequency-Asynchronous ALOHA
Vicente Almonacid, University of Montpellier, France
Laurent Franck, Télécom Bretagne, France

P3-7
Decentralized Power Control for Slotted Spread Spectrum Aloha with Successive Interference Cancellation
Francisco Lázaro Blasco, German Aerospace Center (DLR), Oberpfaffenhofen, Germany

P3-8
Redundant and Non-Redundant Spectrum Shaping Schemes for Reflection-Limited Chip-to-Chip Communication
Yu Zhao, Rainer Grünheid, Gerhard Bauch, Torsten Reuschel, Christian Schuster, Hamburg University of Technology, Germany

P3-9
Approximate Image Authentication and Correction Using Spatial and Frequency Domain Features
Obaid Ur-Rehman, Natasa Zivic, Christoph Ruland, University of Siegen, Germany

P3-10
Timing Attack Resilient Decoding Algorithms for Physical Unclonable Functions
Sven Puchinger, Sven Müelich, Martin Bossert, Ulm University, Germany
Antonia Wachter-Zeh, Technische Universität München, Germany

Session 6: Secure Communications and Compressed Sensing
Chair: Christoph Ruland, University of Siegen

11:20 – 11:40 **Compressed Sampling and Authenticated-Encryption**
Robin Fay, Christoph Ruland, University of Siegen, Germany

11:40 – 12:00 **Compound Biometric Authentication Systems with Strong Secrecy**
Nima Tavangaran, Sebastian Baur, Andrea Grigorescu, Holger Boche, Technische Universität München, Germany

12:00 – 12:20 **Network Coding Security for Bidirectional Network Flows**
Robert F. H. Fischer, Vahid Forutan, Ulm University, Germany
Michael Cyran, Johannes Huber, University of Erlangen-Nuremberg, Germany

12:20 – 12:40 **A New Error Correction Scheme for Physical Unclonable Functions**
Sven Müelich, Martin Bossert, Ulm University, Germany

Session 7: Localization
Chair: Christoph Günther, German Aerospace Center, Oberpfaffenhofen

14:00 – 14:35 **Invited Talk:**
Localization and Communication for Control Applications
Henk Wymeersch, Chalmers University, Sweden

14:35 – 15:10 **Invited Talk:**
Power Allocation for Network Localization
Moe Z. Win, Massachusetts Institute of Technology (MIT), USA

15:10 – 15:45 **Invited Talk:**
Cooperative Interacting Automobiles
Christoph Stiller, Karlsruhe Institute of Technology, Germany

Poster Session P4
15:45 - 16:25

P4-1
Smart Sampling for Ultra-Wideband Nonparametric Belief Propagation Indoor Localization
Rico Mendrzik, Gerhard Bauch, Hamburg University of Technology, Germany

P4-2
Packet-Based Ranging with a Low-Power, Low-Cost Acoustic Modem for Micro AUVs
Christian Renner, Hamburg University of Technology, Germany

P4-3
Multiple Channel Access Techniques for Diffusion-Based Molecular Communication
Sebastian Korte, Invensity GmbH, Germany
Martin Damrath, Peter A. Hoeher, University of Kiel, Germany

P4-4
Detection and Combining Techniques for Asynchronous Random Access with Time Diversity
Federico Clazzer, Francisco Lázaro Blasco, Gianluigi Liva, German Aerospace Center (DLR), Oberpfaffenhofen, Germany
Mario Marchese, DIST-University of Genova, Italy

P4-5
Joint Resource Allocation and Power Control for Maximizing the Throughput of Multicast C-RAN
Di Chen, Volker Kuehn, University of Rostock, Germany

P4-6
Resource Allocation for Underlay Device-to-Device Communication in HetNet with Rate Constraints
Yongyun Choi, Jinhyun Park, Seung Geun Hong, Jae Hong Lee, Seoul National University, Korea

P4-7
Algorithms for the Iterative Estimation of Discrete-Valued Sparse Vectors
Susanne Sparrer, Robert F. H. Fischer, Ulm University, Germany

P4-8
Off-Grid Parameter Estimation Based on Joint Sparse Regularization
Augustin Colonna Walewski, Christian Steffens, Marius Pesavento, Technische Universität Darmstadt, Germany

P4-9
Residual Based Compressed Sensing Recovery Using Sparse Representations Over a Trained Dictionary
Ali Akbari, Maria Trocan, Institut Supérieur d'Electronique de Paris (ISEP), France
Bertrand Granado, Laboratoire d'Informatique, Université de Paris (UPMC), France

P4-10
Spatial Field Reconstruction with Distributed Kernel Least Squares in Mobile Sensor Networks
Ban-Sok Shin, Henning Paul, Armin Dekorsy, University of Bremen, Germany

P4-11
In-Network Processing by the Example of Maxima Estimation in Spatial Fields
Reiner Jedermann, Henning Paul, Walter Lang, University of Bremen, Germany

P4-12
Modulated Wideband Converter for Compressive Phase Retrieval of Bandlimited Signals
Volker Pohl, Holger Boche, Technische Universität München, Germany
Cagkan Yapar, Technische Universität Berlin, Germany

Session 8: Internet of Things and Video Compression
Chair: Anja Klein, Technische Universität Darmstadt

16:25 – 17:00 **Invited Talk:**
Dependable Internet of Things in Adverse Environments
Gernot Kubin, Graz University of Technology, Austria

17:00 – 17:35 **Invited Talk:**
Recent Advances in Video Compression
Thomas Wiegand, Fraunhofer Heinrich-Hertz-Institute, Berlin

Session 9: Cellular Systems: 5G and Beyond
Chair: Armin Dekorsy, University of Bremen

9:00 – 9:35 **Invited Talk:**
Distributed MIMO Signal Transmissions for 5G Mobile Communications Networks
Fumiyuki Adachi, Tohoku University, Sendai, Japan

9:35 – 10:30 **Industry Panel and Interactive Session on Cellular Systems beyond 5G**

Poster Session P5
10:30 - 11:20

P5-1
Ultra-low Latency in Next Generation LTE Radio Access
John Camilo Solano Arenas, Torsten Dudda, Laetitia Falconetti, Ericsson Research, Germany

P5-2
Low-latency Ultra-Reliable 5G Communications: Finite-Blocklength Bounds and Coding Schemes
Johan Östman, Giuseppe Durisi, Erik G. Ström, Chalmers University of Technology, Sweden
Jingya Li, Henrik Sahlin, Ericsson Research, Sweden
Gianluigi Liva, German Aerospace Center (DLR), Oberpfaffenhofen, Germany

P5-3
Delay-Constrained Data Transmission for Energy Harvesting Transmitter
Xiang Li, Tobias Weber, University of Rostock, Germany
Andrea Ortiz, Hussein Al-Shatri, Anja Klein, Technische Universität Darmstadt, Germany

P5-4
Partial Interference Cancellation in Heterogeneous LTE-Advanced Networks
Melanie Falk, Rodrigo Justavino, Gerhard Bauch, Hamburg University of Technology, Germany
Eiko Seidel, Nomor Research GmbH, Germany

P5-5
Stochastic Geometry for the Analysis of Small Radio Cells and PLC Back-Hauling
Francesco Marcuzzi, Andrea M. Tonello, University of Klagenfurt, Austria

P5-6
Feasibility of Serving K Secondary Users in Underlay Cognitive Radio Networks Using Massive MIMO
Shailesh Chaudhari, Danijela Cabric, University of California, Los Angeles, USA

P5-7
Spatial Oversampling in LOS MIMO Systems with 1-Bit Quantization at the Receiver
Tim Hälsig, Berthold Lankl, University of Federal Armed Forces Munich, Germany

P5-8
Pareto Boundary for Massive-MIMO-Relay-Assisted Interference Networks: Half-Duplex vs. Full-Duplex Processing
Ali Kariminezhad, Amr Elbassiouni, Aydin Sezgin, Ruhr-Universität Bochum, Germany

P5-9
Exploiting Additional Transmit Antennas for More Degrees of Freedom in 3-User MIMO Interference Channel with Delayed CSIT
Alexey Buzuverov, Hussein Al-Shatri, Anja Klein, Technische Universität Darmstadt, Germany

P5-10
Interference Alignment and Free-Space Optics Based Backhaul Networks
Ahmed Jendeya, Islamic University of Gaza, Palestine
Mohammed El-Absi, Nidal Zarifeh, Thomas Kaiser, University of Duisburg-Essen, Germany
Salama Said Ikki, Lakehead University, Canada

P5-11
Investigation of Nonlinear Inter-channel Interference in Heterogeneous Flexible Optical Networks
Felix Frey, Robert F. H. Fischer, Ulm University, Germany
Robert Elschner, Carsten Schmidt-Langhorst, Robert Emmerich, Colja Schubert, Johannes K. Fischer, Fraunhofer Heinrich-Herz-Institut, Germany

P5-12
Coded Pulse-Amplitude-Modulation for Intensity-Modulated Optical Communications
Zifeng Wu, Berthold Lankl, University of the Federal Armed Forces Munich, Germany

P5-13
Cyclically Delayed Superposition Intensity Modulation for Rate Boosting IM/DD Communication
Gilbert J. M. Forkel, Peter A. Hoeher, University of Kiel, Germany

Session 10: Massive MIMO
Chair: Wolfgang Utschick, Technische Universität München

11:20 - 11:55 **Invited Talk:**
Massive MIMO – the M2M and IoT Enabler
Erik G. Larsson, Linköping University, Sweden

11:55 - 12:15 **Massive MIMO Detection Based on Belief Propagation in Spatially Correlated Channels**
Yuan Gao, Han Niu, Thomas Kaiser, University of Duisburg-Essen, Germany

12:15 - 12:35 **Design of a Simple Phase Percoder for Generalized Spatial Modulation in LOS Millimeter Wave Channels**
Nemanja Stefan Perović, Peng Liu, Andreas Springer, Johannes Kepler University Linz, Austria

12:35 - 12:55 **On MSE Based Receiver Design for Massive MIMO**
David Neumann, Michael Joham, Wolfgang Utschick, Technische Universität München, Germany

Session 11: Fiber-Optical Communications
Chair: Robert F. H. Fischer, University of Ulm

14:00 – 14:35 **Invited Talk:**
Integrated Parallelism and DSP for Optical Networks with 10-Tb/s Interfaces in Pb/s Systems
Peter J. Winzer, Bell-Labs, USA

14:35 – 15:10 **Invited Talk:**
The Nonlinear Fourier Transform in Fiber-Optic Communications
Sergei K. Turitsyn, Aston University, United Kingdom

15:10 – 15:30 **Second Order Statistics of the Scattering Vector Defining the D-T Nonlinear Fourier Transform**
Sander Wahls, TU Delft, The Netherlands

Session 12: Channel Coding and Modulation
Chair: Dirk Wübben, University of Bremen

16:00 – 16:20 **Spatially Coupled Hybrid Concatenated Codes**
Saeedeh Moloudi, Michael Lentmaier, Lund University, Sweden
Alexandre Graell i Amat, Chalmers University of Technology, Sweden

16:20 – 16:40 **Flexible Length Polar Codes Through Graph Based Augmentation**
Ahmed Elkelesh, Moustafa Ebada, Sebastian Cammerer, Stephan ten Brink, University of Stuttgart, Germany

16:40 – 17:00 **Comparison of Geometric and Probabilistic Shaping with Application to ATSC 3.0**
Fabian Steiner, Georg Böcherer, Technische Universität München, Germany

17:00 – 17:20 **Pulse Shaping Applied to Cyclic Block FMT for Improved Spectrum Usage**
Mauro Girotto, University of Udine, Italy
Andrea M. Tonello, University of Klagenfurt, Austria

17:20 – 17:40 **Finite-Length Analysis of Frameless ALOHA**
Francisco Lázaro Blasco, German Aerospace Center (DLR), Oberpfaffenhofen, Germany
Čedomir Stefanović, Aalborg University, Denmark