

Activity Report 2018–2019

Institute of Communications Engineering

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Impressum

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Stand:

Dezember 2019

Titelbild: Günther Haas

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Preface

The institute for *Communications Engineering* provides research and teaching for several courses of study in the area of communications within the faculty of *Electrical Engineering, Computer Science, and Psychology* of the *Ulm University*. Since 2014 the institute has been largely responsible for the international Master Course *Communications Technology*. Research areas and offered lectures and labs range from physical-layer methods over reliable and secure information transmission in time and space, up to man-machine interfaces.

The present report covers all activities of members of our institute from January 2018 through December 2019.

1 People

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2 Visitors and Visits

Visiting Scholars

■ <i>ITMO University of Saint Petersburg, Russia</i> Denis Ivanko	10/2017–03/2018
■ <i>ITMO University of Saint Petersburg, Russia</i> Alexei Romanenko	10/2017–03/2018
■ <i>Nara Institute of Science and Technology (NAIST), Japan</i> Yuki Matsuda	10/2017–09/2018
■ <i>Sun Yat-sen University, Guangzhou, China</i> Jiongyue Xing	02/2018–12/2019
■ <i>University of Granada, Spain</i> Prof. Zoraida Callejas Carrión	03/2018
■ <i>Ulster University, UK</i> Prof. Mike McTear	03/2018
■ <i>Nara Institute of Science and Technology (NAIST), Japan</i> Prof. Keiichi Yasumoto	03/2018
■ <i>University of the Witwatersrand Johannesburg, South Africa</i> Yuval Genga	06/2018–11/2018
■ <i>Ulster University, UK</i> Prof. Paul McKevitt	08/2018
■ <i>Nara Institute of Science and Technology (NAIST), Japan</i> Prof. Yutaka Arakawa	09/2018
■ <i>Nara Institute of Science and Technology (NAIST), Japan</i> Shogo Kawanaka	09/2018–11/2018
■ <i>University of Granada, Spain</i> Prof. Zoraida Callejas Carrión	01/2019
■ <i>University of the Basque Country, Spain</i> Prof. María Inés Torres	08/2019
■ <i>Nara Institute of Science and Technology (NAIST), Japan</i> Prof. Yuki Matsuda	09/2019

- ***Kyushu University, Japan***
Prof. Yutaka Arakawa 09/2019
- ***ITMO University of Saint Petersburg, Russia***
Dmitrii Ubskii 10/2019–03/2020
- ***Nara Institute of Science and Technology (NAIST), Japan***
Prof. Koichiro Yoshino 11/2019
- ***School of Electronics and Information Technology, Sun Yat-sen University, Guangzhou, China***
Jiongyue Xi 12/2018–12/2019

Research Stays at other Universities

- ***Nara Institute of Science and Technology (NAIST), Japan***
Juliana Miehle 11/2018–12/2018
- ***Nara Institute of Science and Technology (NAIST), Japan***
Dmitrii Fedotov 03/2019–05/2019
- ***Nara Institute of Science and Technology (NAIST), Japan***
Niklas Rach 03/2019–05/2019, 09/2019–12/2019
- ***Technical University Vienna, Austria***
Robert Fischer 08/2019
- ***University of Granada, Spain***
Matthias Kraus, Nicolas Wagner 09/2019–11/2019
- ***Institut d'Électronique de Microélectronique et de Nanotechnologie (IEMN), Lille, France***
Werner Teich 12/2019

3 Awards

- **Prof. Minker and Prof. Glimm**

Google Faculty Research Award, May 2018

Project: Mungo Multi-User indoor Navigation using natural spoken dialog and self-learning Ontologies

- **Dmitrii Fedotov**

Best Demonstration Award, March 2019, Kyoto, Japan,

IEEE Conference on Pervasive Computing and Communications 2019

Towards Real-Time Contextual Touristic Emotion and Satisfaction Estimation with Wearable Devices

- **Sven Puchinger**

Südwestmetall-Förderpreis, April 2019, Stuttgart Dissertation

Construction and Decoding of Evaluation Codes in Hamming and Rank Metric

- **Sven Puchinger**

Award of the Ulmer Universitätsgesellschaft, July 2019, Ulm Dissertation

Construction and Decoding of Evaluation Codes in Hamming and Rank Metric

4 Lectures

A detailed description of the modules is available online.

Advanced Channel Coding (English) Master 2L/1E

Symbol-by-Symbol APP Decoding; Iterative Decoding of Concatenated Codes; LDPC Codes; Algebraic List Decoding

Angewandte Mathematik für Ingenieure (German) Master 3L/1E
(Applied Mathematics for Engineers)

Stochastic Processes; Normal Forms of Matrices and their Application in System Theory; Special Functions (e.g., Bessel Functions) and their Application; Algebraic Structures (e.g., Finite Fields)

Applied Information Theory (English) Master 3L/2E/1P

Uncertainty (Entropy); Mutual Information; Source Coding Theorem; Source Coding Schemes (Shannon–Fano, Huffman, Tunstall, Arithmetic Coding); Universal Source Coding (Lempel–Ziv, Elias–Willems); Channel Capacity and Channel Coding Theorem; Gaussian Channel; Random Coding; Multi-User Information Theory; Dirty Paper Coding; Tomlinson–Harashima Precoding; Information Theory and Cryptology

Benutzerschnittstellen (German) Bachelor/Master 2L/2S
(User Interfaces)

Introduction into the area of human-computer interaction (HCI); Focus: design and development principles of multimodal user interfaces; Usability engineering and evaluation of multimodal user interfaces

Channel Coding (English) Master 3L/2E/1P

Block Codes (BCH, Reed–Solomon, Reed–Muller, Hamming, Simplex, Golay); Decoding Algorithms (Majority Logic, Algebraic, Soft, Hard, GMD); Convolutional Codes and Decoding (Viterbi, Fano, Zigangirov–Jelinek); Generalized Code Concatenation; Coded Modulation

Communications Engineering Seminar (German/English) Master 2S

each semester a current, changing topic from the fields of Communications Engineering, Digital Transmission, Information Theory, Coding Theory, and Signal Processing and its related disciplines is addressed

Communication Systems (English) Master 2L/1E

Mobile Radio Channel; Basics of Mobile Communication Systems; GSM, UMTS, and LTE

Compressed Sensing (English) Master 2L/1E

Geometry of N Dimensions; Geometrical Interpretation of Systems of Linear Equations; Convex Polytopes; Arrangements of Hyperplanes; Approximation Theory; Distance Measures in Banach Spaces; Optimization and Linear Programming; Sampling by Compressed Sensing; Data Acquisition by Compressed Sensing

Dialogue Systems (German) Master 2L/2E

Introduction into the area of multimodal spoken natural language dialogue systems; Focus: Acoustic Processing; Speech Signal Analysis; Speech Recognition; Spoken Natural Language Understanding; Dialogue Processing and Speech Synthesis

Dialogue Systems Project (German/English) Master 4-6S

Multimodal spoken language dialogue systems; component development; practical studies; evaluation

Dialogue Systems Proseminar (German/English) Bachelor 2S

Participants deal with current topics in Spoken Dialogue Systems research

Dialogue Systems Seminar (German/English) Bachelor 2S

Participants deal with current topics in Spoken Dialogue Systems research

Digital Communications (English) Master 4L/2E

Equivalent Complex Baseband; Pulse-Amplitude Modulation (PAM); Variants of PAM Transmission Schemes; Signal-Space Representation; Digital Frequency and Phase Modulation; Channel Models; Equalization of Dispersive Channels; Orthogonal Frequency-Division Multiplexing (OFDM)

Einführung in die Nachrichtentechnik (German) Bachelor 3L/2E/2P
(Introduction to Communications Engineering)

History and Milestones of Communications; Models in Communications; Shannons Uncertainty and Source Coding; Signals for Transmission of Information Channels; Decision Theory; Error Probability; Channel Coding Theorem; Error Correcting Codes; Reliable Data Transmission; Multiple Access; Routing; Security

Embedded Security (German/English) Master 3L/1E

Implementation and Side-Channel Attacks in Cryptology; Countermeasures to Implementation Attacks; Arithmetic for Cryptographic Hardware; Random Number Generators; Physical Unclonable Functions; Digital Tachograph System; Secure Software Download for Electronic Control Units in Cars

Iterative Methods for Wireless Communications (English) Master 2L/1E

Fix-Point Iteration; Convergence and Convergence Rate of Iterative Methods; Vector-Valued Transmission; (Iterative) Vector Equalization; Probability Theory for Iterative Decoding; Tanner Graph; Low-Density Parity Check Codes; BCJR Algorithm; Turbo Codes; Iterative Joint Demapping, Equalization, and Decoding (Turbo Equalization)

Laboratory Digital Communications (English) Master 4P

0. Introduction to MATLAB; 1. Digital Pulse Amplitude Modulation; 2. Implementation of PAM Transmission in MATLAB; 3. Variants of PAM Transmission Schemes; 4. Noncoherent Reception; 5. Signal Space Representation

Mathematik der digitalen Medien (German) Bachelor 2L/1E

Navigation (correlation, random sequences); Mobile phone (channel estimation, convolutional codes); MP3 (digital signal processing); CD (error correction); DVD (source coding); Internet (routing, crypto)

Network and Storage Coding (English) Master 2L/1E

Decoding of Reed-Solomon codes beyond half the minimum distance using modul minimization, power decoding, list decoding, interleaved RS codes, burst error correction; Rank metric codes, subspace codes and applications to network coding, linearized polynomials, skew polynomials, Gabidulin codes, error correction in networks; Coding for flash memories, non-volatile memories, memory with defects, write-once memories based on cyclic codes; Coding for insertions and

deletions, Varshamov-Tenengolts codes; Coding for distributed data storage, locally repairable codes, regeneration codes

Research Trends in Dialogue Systems Seminar (German/English) Master 2S
Participants deal with current topics in Spoken Dialogue Systems research

Satellite Communications and Navigation (English) Master 2L/1E
History, Development, and Potential of Satellite Communications; Satellite Orbits; Launch and Installation in Orbit; Modulation and Multiple Access; Satellite Channel; Link Budget Calculations; Mobile Satellite Communication Systems; Satellite Navigation

Seminar zur Industriepraxis (German/English) Bachelor/Master 3S
Subject-related knowledge and experience from professional practice; experience the business of a typical workday; carry out typical engineering tasks in research and development, quality control, and technical distribution; gain insight into modern techniques and facilities for development and fabrication of electric, electronic, mechatronic and mechanical devices as well as software and hardware components and systems; learn typical operating procedures and organization in industry, as well as the social structure in companies

Signal Theory (English/German) Master 2L/2E
Part I: Stochastic Signals: Random Variables and their Characterization; Principles of Estimation; Stochastic Processes and their Characterization; Mean-Square Estimation and Ergodicity; Part II: Deterministic Signals: Sampling and Interpolation; Principles of Compressed Sensing

Signale und Systeme (German) Bachelor 3L/2E/2T/1P
(Signals and Systems)
Discrete Signals and Systems; z-Transformation; Generalized Functions and Distributions; Continuous Signals and Systems; Fourier-Transformation; Sampling Theorem; Fast Fourier Transform; Laplace-Transformation its Application to Continuous LTI Systems; Stochastic Processes

5 Research

5.1 Research Topics

The research carried out at the institute is divided into the subsequent three groups.

Algebraic Coding Theory — Prof. Bossert

Block and convolutional codes for error correction and detection over Hamming, rank, and combinatorial metrics are constructed and analyzed. The main focus is also on the soft- and hard-decision and list decoding of these code classes. Especially soft-decision decoding of Reed-Solomon codes is an important research area. The applications are random linear network coding, storage coding, compressed sensing, interleaved codes, concatenated codes, and hybrid ARQ protocols. Recently, the application of algebraic coding for cryptology was started.

Communication Theory — Prof. Fischer

The members of the Communication Theory group address the challenges of next-generation communications systems. The main focus is on the mathematical and theoretical foundations of communication and signal processing schemes. This includes equalization methods and the utilization of interference in multiantenna and multiuser systems, in particular, in form of precoding. The problems caused by nonlinearities in the transmission channel, both, the peak-power problem (e.g., in OFDM transmission), as well as nonlinear transmission media (e.g., fiber optics) are addressed. Moreover, the structure of signal is exploited, e.g., via compressed sensing methods, and transmission schemes without any channel knowledge are designed. Finally, security aspects, in particular physical-layer security via coded modulation, are treated.

Dialogue Systems — Prof. Minker

The Dialogue Systems Group has placed its general research focus on the development and evaluation of user-friendly Spoken Language Dialogue Systems (SLDS). This objective is based on the following major aspects: adaptive dialogue management, assistiveness as well as evaluation and usability issues.

The Dialogue Systems Group is joint founder of the interdisciplinary Competence Center Perception and Interactive Technologies. Research groups from Ulm University aim at developing innovative technologies in different application domains and settings for the human-computer interaction. Major research areas include sensor-based models for perception, learning mechanisms and adaptivity, interactive systems in networked applications, ubiquitous computing, multimedia and visualization as well as spoken language dialogue systems interaction and multimodality. The center proposes a framework for fundamental and applied research and combines different interdisciplinary issues.

5.2 Research Projects

5.2.1 DFG Projects

During 2018–2019 the following projects were supported by the German Research Council “Deutsche Forschungsgemeinschaft” (DFG).¹

Komplexwertige Reed-Solomon Codes für deterministisches Compressed Sensing

Project Leader: Bossert, Grant: Bo 867/35-1 (SPP Compressed Sensing in der Informationsverarbeitung)

Duration: 36 months, Begin: June 2015

Aufwandsgünstige HF-Frontends und inkohärente Detektionsverfahren für “Massive MIMO”

Project Leader: Fischer, Grant: Fi 982/12-1, cooperation with Prof. Waldschmidt

Duration: 36 months, Begin: December 2015

Lipschitz Integers für Codierte Modulation und Vorcodierung

Project Leader: Fischer, Grant: Fi 982/13-1, cooperation with Prof. Freudenberger

Duration: 36 months, Begin: December 2015

Codierte Modulation, optimierte Decoder und Entzerrer für faseroptische Kanäle

Project Leader: Fischer, Grant: Fi 982/14-1, cooperation with Dr. J. Fischer

Duration: 36 months, Begin: February 2016

A Companion-Technology for Cognitive Technical Systems

Project Leader: Minker, Grant: SFB Transregio 62 T3 Projekt

Duration: 36 months, Begin: November 2016

Do it yourself, but not alone: Companion-Technologie für die Heimwerkerunterstützung

Project Leader: Minker, Grant: SFB Transregio 62

Duration: 36 months, Begin: January 2017

¹SPP: “Schwerpunktprogramm” (priority programme); SFB: “Sonderforschungsbereich” (SFB).

DFG SPP 1999 Robust Argumentation Machines (RATIO) Mit Argumenten begeistern, Teilprojekt: Verbesserung der Überzeugungskraft von virtuellen Argumenten

Project Leader: Minker, Grant: Mi 741/8-1

Duration: 36 months, Begin: April 2018

Iterative Signal Recovery Algorithms — A Unified View of Turbo and Message-Passing Approaches

Project Leader: Fischer, Grant: Fi 982/8-1, (SPP Compressed Sensing in der Informationsverarbeitung)

Duration: 36 months, Begin: March 2019

Multi-Valued Physical Unclonable Functions

Project Leader: Fischer, Grant: Fi 982/15-1, (cooperation with Prof. Dr.-Ing. Maurits Ortmanns)

Duration: 36 months, Begin: May 2019

5.2.2 BMBF Projects

During 2018–2019 the following projects were supported by the Federal Ministry of Education and Research (BMBF).

EUREKA-Projekt SENDATE-Secure-DCI (SEcure Networking for a DATa center cloud in Europe — Sichere und flexible Datenzentrums-Interkonnektivität)

Code- und Lattice-basierte Sicherheitskonzepte auf der physikalischen Schicht und für „post-quantum“-Kryptographie

Project Leader: Fischer, Grant: 16K/S0483

Duration: 41 months, Begin: June 2016

Forschungsprogramm zur Mensch-Technik Interaktion des BMBF: Kooperative Interaktion und Zielverhandlung mit lernenden autonomen Robotern (RobotKoop)

Project Leader: Minker, Grant: 16SV7967

Duration: 36 months, Begin: June 2018

Deep-Learning-Based Low-Complexity Multi-User Massive MIMO Receivers for Future Wireless Communication Networks

Project Leader: Fischer, Grant: DAAD-BMBF German University in Cairo: Towards Excellence in Research and Teaching
Duration: 24 months, Begin: January 2020

5.2.3 EU — Horizon 2020

During 2018–2019 the following projects were supported by the EU (Horizon 2020 programme).

KRISTINA: A Knowledge-Based Information Agent with Social Competence and Human Interaction Capabilities

Project Leader: Minker, Grant: HORIZON 2020-LEIT-ICT 22 - 2014
Duration: 36 months, Begin: March 2015

EU-Projekt 2020-MSCA-RISE-2018: Mental Health Monitoring through Interactive Conversations (MENHIR)

Project Leader: Minker, Grant: EU-RISE: EU-Projekt 2020-MSCA-RISE-2018
Duration: 48 months, Begin: February 2019

5.2.4 Industry Project

Offline-DSP für OIF 400ZR Konformitätstest

Project Leader: Fischer, Grant: Fraunhofer Institut für Nachrichtentechnik, Heinrich-Hertz-Institut, Berlin
Duration: 5 months, Begin: August 2019

MUNGO: Multi-User Indoor Navigation using natural spoken dialog and self-learning Ontologies

Project Leader: Minker, Grant: Google Faculty Research Award
Duration: 12 months, Begin: March 2018

6 Publications

The publications are sorted according to the respective professor, which coincides with the research groups.

Publications by Prof. Bossert's Group

Books and Book Chapters

- [1] Martin Bossert, editor. Information- and Communication Theory in Molecular Biology, Springer Verlag, 2018. ISBN: 978-3-319-54729-9.

Journal and Conference Papers

- [1] Peter Beelen, Martin Bossert, Sven Puchinger, Johan Rosenkilde. Structural Properties of Twisted Reed-Solomon Codes with Applications to Cryptography. In *IEEE International Symposium on Information Theory (ISIT)*, pp. 946–950, 2018.
- [2] Martin Bossert. An Iterative Hard and Soft Decision Decoding Algorithm for Cyclic Codes. In *SCC 2019; 12th International ITG Conference on Systems, Communications and Coding*, pp. 1–6, 2019.
- [3] Holger Mandry, Andreas Herkle, Ludwig Kürzinger, Joachim Becker, Sven Muelich, Robert Fischer, Maurits Ortmanns. Modular PUF Coding Chain with High Speed Reed Muller Decoder. In *IEEE International Symposium on Circuits and Systems (ISCAS)*, 2019.
- [4] Sven Muelich, Sven Puchinger, Veniamin Stukalov, Martin Bossert. A Channel Model and Soft-Decision Helper Data Algorithms for ROPUFs. In *SCC 2019; 12th International ITG Conference on Systems, Communications and Coding*, pp. 1–6, 2019.
- [5] Sven Muelich, Sebastian Bitzer, Chirag Sudarshan, Christian Weis, Norbert Wehn, Martin Bossert, Robert Fischer. Channel Models for Physical Unclonable Functions based on DRAM Retention Measurements. *XVI International Symposium Problems of Redundancy in Information and Control Systems*, 2019.
- [6] Sven Muelich, Sven Puchinger, Martin Bossert. Constructing an LDPC Code Containing a Given Vector. In *International Workshop on Algebraic and Combinatorial Coding Theory*, 2018.

- [7] Sven Muelich, Sven Puchinger, Martin Bossert. Using Convolutional Codes for Key Extraction in SRAM Physical Unclonable Functions. *Trustworthy Manufacturing and Utilization of Secure Devices (TRUDEVICE)*, 2018.
- [8] Sven Puchinger, Johan Rosenkilde, Irene Bouw. Improved Power Decoding of Interleaved One-Point Hermitian Codes. *Designs, Codes and Cryptography*, Vol. 87, No. 2–3, pp. 589–607, 2019.
- [9] Sven Puchinger, Antonia Wachter-Zeh. Fast Operations on Linearized Polynomials and Their Applications in Coding Theory. *Journal of Symbolic Computation*, Vol. 89, pp. 194–215, 2018.
- [10] Carmen Sippel, Cornelia Ott, Sven Puchinger, Martin Bossert. Reed-Solomon Codes over Fields of Characteristic Zero. In *IEEE International Symposium on Information Theory (ISIT)*, 2019.
- [11] Antonia Wachter-Zeh, Sven Puchinger, Julian Renner. Repairing the Faure-Loidreau Public-Key Cryptosystem. In *2018 IEEE International Symposium on Information Theory (ISIT)*, pp. 2426–2430, 2018.
- [12] Jiongyue Xing, Li Chen, Martin Bossert. Low-Complexity Koetter-Vardy Decoding of Reed-Solomon Codes Using Module Minimization. In *ICC 2019-2019 IEEE International Conference on Communications (ICC)*, pp. 1–6, 2019.
- [13] Jiongyue Xing, Li Chen, Martin Bossert. Module Minimisation based Low-Complexity Soft Decoding of Reed–Solomon Codes. *IET Communications*, 2019.
- [14] Jiongyue Xing, Li Chen, Martin Bossert. Module Minimization based Low-Complexity Chase Decoding of Reed–Solomon Codes. *submitted to IEEE Trans. Commun.*, 2019.
- [15] Jiongyue Xing, Li Chen, Martin Bossert. Progressive Algebraic Soft-Decision Decoding of Reed–Solomon Codes Using Module Minimization. *IEEE Transactions on Communications*, Vol. 67, No. 11, pp. 7379–7391, 2019.
- [16] Jiongyue Xing, Li Chen, Martin Bossert. Progressive Module Minimization for Re-encoding Transformed Soft Decoding of RS Codes. In *2019 IEEE International Symposium on Information Theory (ISIT)*, pp. 1547–1551, 2019.

Publications by Prof. Fischer’s Group

Books and Book Chapters

- [1] Robert F.H. Fischer, Sebastian Stern, Johannes B. Huber. Lattice-Reduction-Aided and Integer-Forcing Equalization: Structures, Criteria, Factorization, and Coding. *Foundations and Trends in Communications and Information Theory*, Vol. 16, No. 1–2, pp. 1–155, 2019.

Journal and Conference Papers

- [1] Stephan Bucher, Ahmed N. Ragab, George Yammine, Robert F.H. Fischer, Christian Waldschmidt. Antenna Design for Noncoherent Massive MIMO Systems. In *International Symposium on Wireless Communication Systems (ISWCS18)*, Lisbon, Portugal, Aug. 2018.
- [2] Stephan Bucher, George Yammine, Robert F.H. Fischer, Christian Waldschmidt. Influence of Channel Parameters on Noncoherent Massive MIMO Systems. In *Proceedings of International ITG/IEEE Workshop on Smart Antennas (WSA)*, Bochum, Germany, Mar. 2018.
- [3] Zaid Dhannoon, Robert F.H. Fischer. Performance of Run-Length-Limited Codes in Visible-Light Communications. In *Proceedings of 12. International ITG Conference on Systems, Communications, and Coding (SCC)*, Feb. 2019.
- [4] Robert F.H. Fischer. Expectation-Consistent Approximate Inference with Vector-Valued Diagonalization — An Unbiasing Interpretation. In *Workshop on Mathematical Data Science*, Oct. 2019.
- [5] Robert F.H. Fischer, Johannes B. Huber, Sebastian Stern, Paulus M. Guter. Multilevel Codes in Lattice-Reduction-Aided Equalization. In *International Zurich Seminar on Communications*, Zurich, Switzerland, Feb. 2018.
- [6] Felix Frey, Robert Emmerich, Colja Schubert, Johannes K. Fischer, Robert F.H. Fischer. Improved Perturbation-based Fiber Nonlinearity Compensation. In *Proceedings of European Conference and Exhibition on Optical Communication (ECOC)*, Roma, Italy, Sep. 2018.
- [7] Felix Frey, Robert Emmerich, Colja Schubert, Johannes K. Fischer, Robert F.H. Fischer. Coded Modulation Using a 512-ary Hurwitz-Integer Constellation. In *Proceedings of 45th European Conference on Optical Communication (ECOC)*, Sep. 2019.
- [8] Felix Frey, Johannes K. Fischer, Robert F.H. Fischer. Probability Distributions of Nonlinear Distortions Obtained from the Sampled Nonlinear Transfer Function. In *ITG-Workshop 5.3.1*, Helmut-Schmidt-Universität Hamburg, Hamburg, Germany, Feb. 2018.
- [9] Christina Knill, Benedikt Schweizer, Susanne Sparrer, Fabian Roos, Robert F.H. Fischer, Christian Waldschmidt. High Range and Doppler Resolution by Application of Compressed Sensing Using Low Baseband Bandwidth OFDM Radar. *IEEE Transactions on Microwave Theory and Techniques*, Vol. 66, No. 7, pp. 3535–3546, 2018.
- [10] Holger Mandry, Andreas Herkle, Ludwig Kürzinger, Joachim Becker, Sven Muelich, Robert F.H. Fischer, Maurits Ortmanns. Modular PUF Coding Chain

- with High Speed Reed Muller Decoder. In *IEEE International Symposium on Circuits and Systems (ISCAS)*, May 2019.
- [11] Sven Muelich, Sebastian Bitzer, Chirag Sudarshan, Christian Weis, Norbert Wehn, Martin Bossert, Robert F.H. Fischer. Channel Models for Physical Unclonable Functions based on DRAM Retention Measurements. In *XVI International Symposium Problems of Redundancy in Information and Control Systems*, Oct. 2019.
- [12] Johannes Pfeiffer, Robert F.H. Fischer. Multilevel Coding for Physical-Layer Security in Optical Networks. In *ITG-Fachtagung Photonische Netze*, May 2018.
- [13] Johannes Pfeiffer, Robert F.H. Fischer. Signal Constellations for Physical-Layer Security. In *Proceedings of 12. International ITG Conference on Systems, Communications, and Coding (SCC)*, Feb. 2019.
- [14] Daniel Rohweder, Sebastian Stern, Robert F.H. Fischer, Sergo Shavgulidze, Jürgen Freudenberger. Low-Complexity Detection for Generalized Multistream Spatial Modulation. In *2019 IEEE 20th International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, July 2019.
- [15] Carsten Schmidt-Langhorst, Johannes Pfeiffer, Robert Elschner, Felix Frey, Robert Emmerich, Robert F.H. Fischer, Colja Schubert. Experimental Investigation of Security Gaps when using Punctured LDPC Coding in Coherent Systems up to 64-GBd DP-64QAM. In *ITG-Fachtagung Photonische Netze*, May 2019.
- [16] Susanne Sparrer, Robert F.H. Fischer. Bias Compensation in Iterative Soft-Feedback Algorithms with Application to (Discrete) Compressed Sensing. In *IEEE Statistical Signal Processing Workshop 2018*, Freiburg, Germany, June 2018.
- [17] Sebastian Stern, Robert F.H. Fischer. Quaternion-Valued Multi-User MIMO Transmission via Dual-Polarized Antennas and QLLL Reduction. In *Proceedings of 25th International Conference on Telecommunications (ICT)*, Saint Malo, France, June 2018.
- [18] Sebastian Stern, Felix Frey, Johannes K. Fischer, Robert F.H. Fischer. Two-Stage Dimension-Wise Coded Modulation for Four-Dimensional Hurwitz-Integer Constellations. In *Proceedings of 12. International ITG Conference on Systems, Communications, and Coding (SCC)*, Feb. 2019.
- [19] Sebastian Stern, Daniel Rohweder, Jürgen Freudenberger, Robert F.H. Fischer. Binary Multilevel Coding over Eisenstein Integers for MIMO Broadcast Transmission. In *23rd International ITG Workshop on Smart Antennas*, Apr. 2019.
- [20] Sebastian Stern, Daniel Rohweder, Jürgen Freudenberger, Robert F.H. Fischer. Multilevel Coding over Eisenstein Integers with Ternary Codes. In *Proceedings of 12. International ITG Conference on Systems, Communications, and Coding (SCC)*, Rostock, Germany, Feb. 2019.

- [21] Werner G. Teich, Samhita Roy, Robert F.H. Fischer. Fiber-Optic Transmission with a Direct Detection Receiver: Iterative Implementation of Block Linear Equalization. In *ITG-Fachtagung Photonische Netze*, May 2019.
- [22] George Yammine, Stephan Bucher, Robert F.H. Fischer. Noncoherent Detection for an EM-Lens-Enabled Massive MIMO System. In *Proceedings of 12. International ITG Conference on Systems, Communications, and Coding (SCC)*, Feb. 2019.
- [23] George Yammine, Robert F.H. Fischer. Optimization of Subspace Projection in Noncoherent Massive MIMO Systems. In *Proceedings of 12. International ITG Conference on Systems, Communications, and Coding (SCC)*, Feb. 2019.
- [24] George Yammine, Sebastian Stern, Robert F.H. Fischer. Precoding for MIMO Uplink Transmission Over EM-Lens-Based Correlated Channels. In *Proceedings of International ITG/IEEE Workshop on Smart Antennas (WSA)*, Bochum, Germany, Mar. 2018.

Publications by Prof. Minker's Group

Journal and Conference Papers

- [1] Annalena Aicher, Niklas Rach, Wolfgang Minker, Stefan Ultes. Opinion Building based on the Argumentative Dialogue System BEA. In *Proceedings of the 10th International Workshop on Spoken Dialog Systems Technology (IWSDS 2019)*, 2019.
- [2] Oleg Akhtiamov, Dmitrii Fedotov, Wolfgang Minker. A Comparative Study of Classical and Deep Classifiers for Textual Addressee Detection in Human-Human-Machine Conversations. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 2019.
- [3] Oleg Akhtiamov, Vasily Palkov. Gaze, Prosody and Semantics. Relevance of Various Multimodal Signals to Addressee Detection in Human-Human-Computer Conversations. In *20th International Conference on Speech and Computer (SPECOM 2018)*. Springer, 2018.
- [4] Oleg Akhtiamov, Ingo Siegert, Alexey Karpov, Wolfgang Minker. Cross-Corpus Data Augmentation for Acoustic Addressee Detection. In *20th Annual SIGdial Meeting on Discourse and Dialogue*, 2019.
- [5] Gregor Behnke, Marvin Schiller, Matthias Kraus, Pascal Bercher, Mario Schmautz, Michael Dorna, Michael Dambier, Wolfgang Minker, Birte Glimm, Susanne Biundo. Alice in DIY wonderland or: Instructing novice users on how to use tools in DIY projects. *AI Communications*, pp. 1–27, 2019.

- [6] Gregor Behnke, Marvin Schiller, Matthias Kraus, Pascal Bercher, Mario Schmautz, Michael Dorna, Wolfgang Minker, Birte Glimm, Susanne Biundo. Instructing Novice Users on How to Use Tools in DIY Projects. In *IJCAI*, 2018.
- [7] Monique Dittrich, Sebastian Zepf. Exploring the Validity of Methods to Track Emotions Behind the Wheel. In *International Conference on Persuasive Technology*, pp. 115–127. Springer, 2019.
- [8] Denis Dresvyanskiy, Tatiana Karaseva, Sergei Mitrofanov, Claudia Redenbach, Stefanie Schwaar, Vitalii Makogin, Evgeny Spodarev. Application of clustering methods to anomaly detection in fibrous media. *IOP Conference Series: Materials Science and Engineering*, Vol. 537, pp. 7, 2019.
- [9] Dmitrii Fedotov, Denis Ivanko, Maxim Sidorov, Wolfgang Minker. Contextual Dependencies in Time-Continuous Multidimensional Affect Recognition. In *Proceedings of the 11th International Conference on Language Resources and Evaluation (LREC 2018)*, 2018.
- [10] Dmitrii Fedotov, Heysem Kaya, Alexey Karpov. Context Modeling for Cross-corpus Dimensional Acoustic Emotion Recognition: Challenges and Mixup. In *Proceedings of the 20th International Conference on Speech and Computer, SPECOM 2018*, 2018.
- [11] Dmitrii Fedotov, Yuki Matsuda, Wolfgang Minker. From Smart to Personal Environment: Integrating Emotion Recognition into Smart Houses. In *2019 IEEE International Conference on Pervasive Computing and Communications Workshops*, pp. 943–948, 2019.
- [12] Dmitrii Fedotov, Yuki Matsuda, Yuta Takahashi, Yutaka Arakawa, Wolfgang Minker. Towards Real-Time Contextual Touristic Emotion and Satisfaction Estimation with Wearable Devices. In *2019 IEEE International Conference on Pervasive Computing and Communications Workshops*, pp. 358–360, 2019.
- [13] Dmitrii Fedotov, Yuki Matsuda, Yuta Takahashi, Yutaka Arakawa, Keiichi Yasumoto, Wolfgang Minker. Towards Estimating Emotions and Satisfaction Level of Tourist based on Eye Gaze and Head Movement. In *Smart Computing (SMART-COMP), 2018 IEEE International Conference on*, 2018.
- [14] Dmitrii Fedotov, Olga Perepelkina, Evdokia Kazimirova, Maria Konstantinova, Wolfgang Minker. Multimodal approach to engagement and disengagement detection with highly imbalanced in-the-wild data. In *Proceedings of the Workshop on Modeling Cognitive Processes from Multimodal Data, MCPMD '18*. ACM, 2018.
- [15] Denis Ivanko, Alexey Karpov, Dmitrii Fedotov, Irina Kipyatkova, Dmitry Ryumin, Dmitriy Ivanko, Wolfgang Minker, Milos Zelezny. Multimodal speech recognition: increasing accuracy using high speed video data. *Journal on Multimodal*

User Interfaces, Vol. 12, No. 4, pp. 319–328, 2018.

- [16] Heysem Kaya, Dmitrii Fedotov, Denis Dresvyanskiy, Metehan Doyran, Danila Mamontov, Maxim Markitantov, Alkim Almila Akdag Salah, Evrim Kavcar, Alexey Karpov, Albert Ali Salah. Predicting depression and emotions in the cross-roads of cultures, para-linguistics, and non-linguistics. 2019.
- [17] Heysem Kaya, Dmitrii Fedotov, Ali Yesilkanat, Oxana Verkholyak, Yang Zhang, Alexey Karpov. LSTM based Cross-corpus and Cross-task Acoustic Emotion Recognition. In *Proc. Interspeech 2018*, 2018.
- [18] Matthias Kraus, Gregor Behnke, Pascal Bercher, Marvin Schiller, Susanne Biundo, Birte Glimm, Wolfgang Minker. A Multimodal Dialogue Framework for Cloud-Based Companion Systems. In *Proceedings of the 10th International Workshop on Spoken Dialog Systems Technology (IWSDS 2018)*, May 2018.
- [19] Matthias Kraus, Johannes Maria Kraus, Martin Baumann, Wolfgang Minker. Effects of Gender Stereotypes on Trust and Likability in Spoken Human-Robot Interaction. In *Proceedings of the Eleventh International Conference on Language Resources and Evaluation (LREC 2018)*, Miyazaki, Japan, 2018. European Language Resources Association (ELRA).
- [20] Yuki Matsuda, Dmitrii Fedotov, Yuta Takahashi, Yutaka Arakawa, Keiichi Yasumoto, Wolfgang Minker. EmoTour: Estimating Emotion and Satisfaction of Users Based on Behavioral Cues and Audiovisual Data. *Sensors*, Vol. 18, No. 11, 2018.
- [21] Yuki Matsuda, Dmitrii Fedotov, Yuta Takahashi, Yutaka Arakawa, Keiichi Yasumoto, Wolfgang Minker. EmoTour: Multimodal Emotion Recognition using Physiological and Audio-Visual Features. In *Proceedings of the 2018 ACM International Joint Conference and 2018 International Symposium on Pervasive and Ubiquitous Computing and Wearable Computers*, pp. 946–951. ACM, 2018.
- [22] Yuki Matsuda, Dmitrii Fedotov, Yuta Takahashi, Yutaka Arakawa, Keiichi Yasumoto, Wolfgang Minker. Estimating User Satisfaction Impact in Cities using Physical Reaction Sensing and Multimodal Dialogue System. In *Proceedings of the 9th International Workshop On Spoken Dialogue Systems (IWSDS)*, 2018.
- [23] Juliana Miehle, Ilker Bagci, Wolfgang Minker, Stefan Ultes. A Social Companion and Conversational Partner for the Elderly. In *Advanced Social Interaction with Agents*, Vol. 510 of *Lecture Notes in Electrical Engineering*, pp. 103–109. Springer International Publishing, 2019.
- [24] Juliana Miehle, Nadine Gerstenlauer, Daniel Ostler, Hubertus Feußner, Wolfgang Minker, Stefan Ultes. Expert Evaluation of a Spoken Dialogue System in a Clinical Operating Room. In *Proceedings of the Eleventh International Conference on Language Resources and Evaluation (LREC 2018)*. European Language Resources

Association (ELRA), May 2018.

- [25] Juliana Miehle, Wolfgang Minker, Stefan Ultes. Exploring the Impact of Elaborateness and Indirectness on User Satisfaction in a Spoken Dialogue System. In *Adjunct Publication of the 26th Conference on User Modeling, Adaptation and Personalization (UMAP)*, pp. 165–172. ACM, July 2018.
- [26] Juliana Miehle, Wolfgang Minker, Stefan Ultes. What Causes the Differences in Communication Styles? A Multicultural Study on Directness and Elaborateness. In *Proceedings of the Eleventh International Conference on Language Resources and Evaluation (LREC 2018)*. European Language Resources Association (ELRA), May 2018.
- [27] Juliana Miehle, Louisa Pragst, Wolfgang Minker, Stefan Ultes. Enabling Dialogue Management with Dynamically Created Dialogue Actions. *arXiv:1907.00684*, 2019.
- [28] Louisa Pragst, Wolfgang Minker, Stefan Ultes. Exploring the Applicability of Elaborateness and Indirectness in Dialogue Management. In Maxine Eskenazi, Laurence Devillers, Joseph Mariani, editors, *Advanced Social Interaction with Agents: 8th International Workshop on Spoken Dialog Systems*, pp. 189–198. Springer International Publishing, Cham, 2019.
- [29] Louisa Pragst, Niklas Rach, Wolfgang Minker, Stefan Ultes. On the Vector Representation of Utterances in Dialogue Context. In *Proceedings of the Eleventh International Conference on Language Resources and Evaluation (LREC 2018)*, Paris, France, May 2018. European Language Resources Association (ELRA).
- [30] Louisa Pragst, Stefan Ultes. Changing the Level of Directness in Dialogue using Dialogue Vector Models and Recurrent Neural Networks. In *Proceedings of the 19th Annual Meeting of the Special Interest Group on Discourse and Dialogue (SIGDIAL)*, pp. 11–19. Association for Computational Linguistics, July 2018.
- [31] Niklas Rach, Saskia Langhammer, Wolfgang Minker, Stefan Ultes. Utilizing Argument Mining Techniques for Argumentative Dialogue Systems. In *Proceedings of the 9th International Workshop On Spoken Dialogue Systems (IWSDS)*, May 2018.
- [32] Niklas Rach, Wolfgang Minker, Stefan Ultes. Handling Unknown User Arguments in Argumentative Dialogue Systems. In *Proceedings of the 32nd British Human Computer Interaction Conference (HCI)*, July 2018.
- [33] Niklas Rach, Wolfgang Minker, Stefan Ultes. Markov Games for Persuasive Dialogue. In *Proceedings of the 7th International Conference on Computational Models of Argument*, Sep. 2018.
- [34] Niklas Rach, Klaus Weber, Louisa Pragst, Elisabeth André, Wolfgang Minker, Stefan Ultes. EVA: A Multimodal Argumentative Dialogue System. In *Proceedings of*

- the 20th ACM International Conference on Multimodal Interaction, Oct. 2018.
- [35] Niklas Rach, Klaus Weber, Annalena Aicher, Florian Lingenfelser, Elisabeth André, Wolfgang Minker. Emotion Recognition Based Preference Modelling in Argumentative Dialogue Systems. In *Accepted for presentation at the 1st International Workshop on Pervasive Computing and Spoken Dialogue Systems Technology*, 2019.
- [36] Marvin Schiller, Gregor Behnke, Pascal Bercher, Matthias Kraus, Michael Dorna, Felix Richter, Susanne Biundo, Birte Glimm, Wolfgang Minker. Evaluating Knowledge-Based Assistance for DIY. In *Mensch und Computer 2018*, 2018.
- [37] Maria Schmidt, Patricia Braunger. A Survey on Different Means of Personalized Dialog Output for an Adaptive Personal Assistant. In *Adjunct Publication of the 26th Conference on User Modeling, Adaptation and Personalization*, pp. 75–81. ACM, 2018.
- [38] Maria Schmidt, Patricia Braunger. Towards a Speaking Style-Adaptive Assistant for Task-Oriented Applications. In *Elektronische Sprachsignalverarbeitung 2018: Tagungsband der 29. Konferenz*, 2018.
- [39] Maria Schmidt, David Helbig, Ojashree Bhandare, Daniela Stier, Wolfgang Minker, Steffen Werner. Assessing Objective Indicators of Users' Cognitive Load During Proactive In-Car Dialogs. In *27th Conference on User Modeling, Adaptation and Personalization Adjunct, June 9–12, 2019, Larnaca, Cyprus*, 2019.
- [40] Maria Schmidt, Daniela Stier, Steffen Werner, Wolfgang Minker. Exploration and Assessment of Proactive Use Cases for an In-Car Voice Assistant. *Elektronische Sprachsignalverarbeitung*, 2019.
- [41] Yuta Takahashi, Yuki Matsuda, Dmitrii Fedotov, Yutaka Arakawa, Wolfgang Minker, Keiichi Yasumoto. Analysis of Tourist's Unconscious Gesture Toward Inner State Estimation During Sightseeing. In *IEICE, Technical Committee on Human Probes (HPB)*, 2018.
- [42] Stefan Ultes, Juliana Miehle, Wolfgang Minker. On the Applicability of a User Satisfaction-Based Reward for Dialogue Policy Learning. In *Advanced Social Interaction with Agents*, Vol. 510 of *Lecture Notes in Electrical Engineering*, pp. 211–217. Springer International Publishing, 2019.
- [43] Oxana Verkholyak, Dmitrii Fedotov, Heysem Kaya, Yang Zhang, Alexey Karpov. Hierarchical Two-level Modelling of Emotional States in Spoken Dialog Systems. In *2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pp. 6700–6704, 2019.
- [44] Nicolas Wagner, Matthias Kraus, Niklas Rach, Wolfgang Minker. How to address humans: System barge-in in multi-user HRI. In *Proceedings of the 10th International Workshop on Spoken Dialog Systems Technology (IWSDS 2019)*, 2019.

- [45] Sebastian Zepf, Monique Dittrich, Javier Hernandez, Alexander Schmitt. Towards Empathetic Car Interfaces: Emotional Triggers while Driving. In *Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems*, p. LBW0129. ACM, 2019.

Publications by Other Members of the Institute

- [1] Werner G. Teich. Low-Power High-Speed Signal Processing: From Iterative Algorithm to Analog Circuits. The University of Auckland, Auckland, New Zealand, January 2018.
- [2] Werner G. Teich. From Iterative Threshold Decoding to a Low-Power High-Speed Analog VLSI Decoder Implementation. In *CA15104 9th MC and Scientific Meeting*, Dublin, Ireland, January 2019.
- [3] Werner G. Teich. Low Power High Speed Nonlinear Signal Processing: From Iterative Algorithm to Analog Electronic Circuits. Institut d'Électronique de Microélectronique et de Nanotechnologie (IEMN), Lille, France, December 2019.
- [4] Werner G. Teich, Heiko Teich, Giuseppe Oliveri. From Iterative Threshold Decoding to a Low-Power High-Speed Analog VLSI Decoder Implementation. In Ignacio Rojas, Gonzalo Joya, Andreu Catala, editors, *Advances in Computational Intelligence*, pp. 615–628, Cham, 2019. Springer International Publishing.

7 Seminars

- Roland Schenk. *Vergleich von reell- und komplexwertigen Algorithmen zur Gitterbasisreduktion in MIMO-Systemen*, February 12, 2018.
- Bobae Kim. *End-to-End Time-Continuous Emotion Recognition for Spontaneous Interactions*, February 26, 2018.
- Prof. Zoraida Callejas Carrión (University of Granada, Spain). *Relevant Aspects for the Development of Conversational Coaches*, March 09, 2018.
- Markus Wirsing. *Evaluation of Synchronization Methods for Maritime Broadband Communication in a Software Defined Radio*, April 24, 2018.
- Tobias Hengge. *Allgemeine Schätzmethoden für iteratives Compressed Sensing*, June 07, 2018.
- Carmen Sippel. *Differential Linear Network Coding in Slowly-Varying Networks*, June 14, 2018.
- Raul Sergio Degenhart. *Artificial Intelligence Based Dialog Decisions in Speech Dialog Systems*, June 18, 2018.
- Christina Diemer. *Implementierung und Analyse eines Multiagentensystems mit Amazon Alexa*, July 02, 2018.
- Samhita Roy. *Low-Complexity Iterative Equalization for Fiber-Optic Transmission with a Direct Detection Receiver*, September 17, 2018.
- Sushmita Raj. *Variants of Message Passing Decoding for LDPC codes in Noncoherent Massive MIMO*, September 17, 2018.
- Sebastian Bitzer. *Physical Unclonable Functions based on DRAM*, December 10, 2018.
- Yuchi Yang. *Multi-Agent Actor-Critic Reinforcement Learning for Argumentative Dialogue Systems*, December 17, 2018.
- Timo Häge. *„Graceful Degradation„ in Sprachdialogsystemen*, December 17, 2018.
- Hannes Heinisch. *Evaluationsmethodik zur natürlichen Aktivierung von Sprachdialogsystemen ohne Schlüsselwort*, December 17, 2018.
- Minchan Park. *Visual Emotion Recognition in the Wild at Multi-user and Group Levels*, February 18, 2019.

- Isabel Feustel. *Adaptive Dialogue Management for a Script Knowledge Based Conversational Assistant*, April 8, 2019.
- Musab Ahmed Eltayeb Ahmed. *Implementation of Gabidulin Codes in Sage*, June 7, 2019.
- Marius Welk. *Recovery of Linearly Compressed Sparse Vectors*, July 17, 2019.
- Rahul Goswami. *Unitarily Preequalized Lattice-Reduction-Aided Equalization*, July 17, 2019.
- Yonatan Marin. *Variants of Message-Passing Decoding for Low-Density Parity-Check Codes*, July 17, 2019.
- Abdelrahman Mahdy. *Efficient Implementation of Minkowski Reduction for Lattice-Reduction-Aided MIMO Transmission via MEX-Files*, August 12, 2019.
- Pavan Shigehalli. *Natural Language Understanding in Argumentative Dialogue Systems*, September 23, 2019.
- Patrick Preißner. *Effiziente Strukturen für Geräuschreduktion mit neuronalen Netzen*, October 28, 2019.
- Christian Ziegler. *Channel Estimation in 1-Bit Massive MIMO Systems*, December 11, 2019.
- Keerthana Ravi Kumar. *Fiber-Optic Transmission with a Direct Detection Receiver: Low-Complexity Equalization based on a Continuous-Time Recurrent Neural Network*, December 11, 2019.
- Philip Seldschopf. *Trust Handling of Relational Agents for Mental Health Applications*, December 16, 2019.

8 Ph.D. Theses

8.1 Supervised Ph.D. Theses

- Sven Puchinger. *Construction and Decoding of Evaluation Codes in Hamming and Rank Metric*, Institute of Communications Engineering, Ulm University, 2018.
Reviewers: Prof. M. Bossert, Prof. T. Høholdt, Technical University of Denmark, Copenhagen, Denmark.
- Martin Frassl. *From Curse to Blessing — Harnessing Geomagnetic Field Disturbances for Ubiquitous Navigation*, Institute of Communications Engineering, Ulm University, 2018.
Reviewers: Prof. W. Minker, Prof. P. Händel, Royal Institute of Technology KTH, Stockholm, Sweden, Prof. J. Lindner.
- Christian Gentner. *Channel-SLAM: Multipath Assisted Positioning*, Institute of Communications Engineering, Ulm University, 2018.
Reviewers: Prof. U.-C. Fiebig, DLR Oberpfaffenhofen Prof. M. Bossert.
- Florian Pregizer. *Effiziente broadcast Datenübertragung in mobilen Ad-hoc-Netzwerken*, Institute of Communications Engineering, Ulm University, 2018.
Reviewers: Prof. H.-P. Großmann, Prof. F. Kargl, Ulm University.
- Anastasiia Spirina. *Automatic Assessment of Interaction Quality in Human-Human Conversations*, Institute of Communications Engineering, Ulm University, 2018.
Reviewers: Prof. W. Minker, Prof. A. Karpov, ITMO University, St. Petersburg, Russia.
- Yuki Matsuda. *Study on Human-in-the-loop Sensing in Urban Environment Analysis*, Reviewers: Prof. K. Yasumoto, Nara University of Science and Technology (NAIST), Japan, Prof. W. Minker.
- Sebastian Patrick Stern. *Advanced Equalization and Coded-Modulation Strategies for Multiple-Input/Multiple-Output Systems*, Institute of Communications Engineering, Ulm University, 2019.
Reviewers: Prof. R. Fischer, Prof. C. Ling, Imperial College London, United Kingdom.
- Susanne Sparrer. *Algorithms for (Discrete) Compressed Sensing — A Communi-*

cations Engineering Perspective, Institute of Communications Engineering, Ulm University, 2019.

Reviewers: Prof. R. Fischer, Prof. N. Görtz, Vienna University of Technology, Austria.

- Sven Müelich. *Channel Coding for Hardware Intrinsic Security*, Institute of Communications Engineering, Ulm University, 2019.

Reviewers: Prof. M. Bossert, Prof. G. Sigl, TU Munich.

8.2 Co-Supervised Ph.D. Theses

- Matthias Hiller. *Key Derivation with Physical Unclonable Functions*, TU Munich, 2016.

Reviewers: Prof. G. Sigl, Prof. M. Bossert.

- Frank Daniel Honold. *Interaktionsmanagement und Modalitätsarbitrierung für eine adaptive und multimodale Mensch-Computer Interaktion*, Ulm University, 2018.

Reviewers: Prof. M. Weber, Prof. W. Minker.

- Gregor Ulrich Mehlmann. *Modeling Interpersonal Coordination and Grounding Behavior in Joint Activities with Social Companions*, Augsburg University, 2018.

Reviewers: Prof. E. André, Prof. B. Möller, Prof. W. Minker.

- Georg Layher. *What, Where and When? Mechanisms of Learning Biological Motion Representations*, Ulm University, 2018.

Reviewers: Prof. H. Neumann, Prof. W. Minker.

- Christopher Hepner. *An IEEE 802.11 Based Wireless Mesh Disaster Recovery System with Lifetime Enhancement*, FAU Erlangen–Nürnberg, 2019.

Reviewers: Prof. R. Weigel, Prof. R. Münzner, Prof. R. Fischer.

- Miroslav Hlaváč. *Automated Lipreading with LipsID Features*, University of West Bohemia, Pilsen, 2019.

Reviewers: Dr. Miloš Železný, University of West Bohemia, Pilsen, Czech Republic, Prof. W. Minker.

- Roi Rath, *Investigation of Digital Signal Processing Techniques for Compensation of Linear and Nonlinear Impairments in Fiber-Optic Communication Systems*, CAU Kiel, 2019.

Reviewers: Prof. W. Rosenkranz, Prof. R. Fischer.

- Stefan Birgmeier. *Message Passing for Multidimensional Inverse Problems*, TU Vienna, Austria, 2019

Reviewers: Prof. N. Görtz, Prof. R. Fischer.

8.3 Co-Supervised Habilitations

- Dr.-Ing. Ronald Böck. *Multimodal Analyses in Human-Machine Interaction towards Group Interactions*, Otto von Guericke University Magdeburg, 2019
Reviewers: Prof. A. Wendemuth, Prof. W. Schuller, University Augsburg, Prof. W. Minker.

9 Theses

9.1 Master Theses

- [1] Musab Ahmed Eltayeb Ahmed. *Implementation of Gabidulin Codes in Sage*. Master's thesis, Supervisors: Cornelia Ott and Sven Muelich; Reviewer: Prof. M. Bossert, May 2019.
- [2] Raul Sergio Degenhart. *Artificial Intelligence Based Dialog Decisions in Speech Dialog Systems*. Master's thesis, Supervisor: Sven Reichel; Reviewer: Prof. W. Minker, June 2018.
- [3] Isabel Feustel. *Adaptive Dialogue Management for a Script Knowledge Based Conversational Assistant*. Master's thesis, Supervisor: Juliana Miehle; Reviewer: Prof. W. Minker, Apr. 2019.
- [4] Rahul Goswami. *Unitarily Preequalized Lattice-Reduction-Aided Equalization*. Master's thesis, Supervisor: Sebastian Stern; Reviewer: Prof. R. Fischer, July 2019.
- [5] Hannes Heinisch. *Evaluationsmethodik zur natürlichen Aktivierung von Sprach-dialogsystemen ohne Schlüsselwort*. Master's thesis, Supervisors: Sven Riedel and Stefan Ultes; Reviewer: Prof. W. Minker, Dec. 2018.
- [6] Bobae Kim. *End-to-End Time-Continuous Emotion Recognition for Spontaneous Interactions*. Master's thesis, Supervisor: Dmitrii Fedotov; Reviewer: Prof. W. Minker, Jan. 2018.
- [7] Keerthana Ravi Kumar. *Fiber-Optic Transmission with a Direct Detection Receiver: Low Complexity Equalization based on a Continuous-Time Recurrent Neural Network*. Master's thesis, Supervisor: Werner Teich; Reviewer: Prof. R. Fischer, Nov. 2019.
- [8] Diana Betancourt Lopez. *A Study on Cognitive-Affective based Proactive Dialogue Strategie*. Master's thesis, Supervisor: Matthias Kraus; Reviewer: Prof. W. Minker, Dec. 2019.
- [9] Yonatan Marin. *Variants of Message-Passing Decoding for Low-Density Parity-Check Codes*. Master's thesis, Supervisors: George Yamine and Sven Muelich; Reviewer: Prof. R. Fischer, June 2019.
- [10] Minchan Park. *Visual Emotion Recognition in the Wild at Multi-user and Group Levels*. Master's thesis, Supervisor: Dmitrii Fedotov; Reviewer: Prof. W. Minker, Feb. 2019.

- [11] Patrick Preißner. *Effiziente Strukturen für Geräuschreduktion mit neuronalen Netzen*. Master's thesis, Supervisor: Friedrich Faubel; Reviewer: Prof. W. Minker, Nov. 2019.
- [12] Sushmita Raj. *Variants of Message Passing Decoding for LDPC codes in Noncoherent Massive MIMO*. Master's thesis, Supervisors: George Yammine and Sven Muelich; Reviewer: Prof. R. Fischer, Aug. 2018.
- [13] Samhita Roy. *Low Complexity Iterative Equalization for Fiber-Optic Transmission with a Direct Detection Receiver*. Master's thesis, Supervisor: Werner Teich; Reviewer: Prof. R. Fischer, Aug. 2018.
- [14] Philip Seldschopf. *Trust Handling of Relational Agents for Mental Health Applications*. Master's thesis, Supervisor: Matthias Kraus; Reviewer: Prof. W. Minker, Dec. 2019.
- [15] Pavan Shigehalli. *Natural Language Understanding in Argumentative Dialogue Systems*. Master's thesis, Supervisor: Niklas Rach; Reviewer: Prof. W. Minker, Aug. 2019.
- [16] Carmen Sippel. *Differential Linear Network Coding in Slowly-Varying Networks*. Master's thesis, Supervisor: Sven Puchinger; Reviewer: Prof. M. Bossert, June 2018.
- [17] Marius Welk. *Recovery of Linearly Compressed Sparse Vectors*. Master's thesis, Supervisor: Dejan Lazich; Reviewer: Prof. M. Bossert, June 2019.
- [18] Markus Wirsing. *Evaluation of Synchronization Methods for Maritime Broadband Communication in a Software Defined Radio*. Master's thesis, Supervisor and Reviewer: Prof. U. Fiebig, Apr. 2018.
- [19] Yuchi Yang. *Multi-Agent Actor-Critic Reinforcement Learning for Argumentative Dialogue Systems*. Master's thesis, Supervisor: Niklas Rach; Reviewer: Prof. W. Minker, Dec. 2018.
- [20] Christian Ziegler. *Channel Estimation in 1-Bit Massive MIMO Systems*. Master's thesis, Supervisor: George Yammine; Reviewer: Prof. R. Fischer, Dec. 2019.

9.2 Bachelor Theses

- [1] Sebastian Benedikt Bitzer. *Physical Unclonable Functions based on DRAM*. Bachelor's thesis, Supervisors: Sven Muelich and Sven Puchinger; Reviewer: Prof. M. Bossert, Nov. 2018.
- [2] Christina Diemer. *Implementierung und Analyse eines Multiagentensystems mit Amazon Alexa*. Bachelor's thesis, Supervisor: Sabine Wieluch; Reviewer: Prof. W. Minker, June 2018.
- [3] Timo Häge. *"Graceful Degradation" in Sprachdialogsystemen*. Bachelor's thesis, Supervisor: Matthias Kraus; Reviewer: Prof. W. Minker, Dec. 2018.
- [4] Tobias Hengge. *Allgemeiner Schätzmethoden für iteratives Compressed Sensing*. Bachelor's thesis, Supervisor: Susanne Sparrer; Reviewer: Prof. R. Fischer, June 2018.
- [5] Niklas Lindemann. *Multi-User Recognition in Human-Robot Interaction*. Bachelor's thesis, Supervisor: Nicolas Wagner; Reviewer: Prof. W. Minker, July 2019.
- [6] Abdelrahman Mahdy. *Efficient Implementation of Minkowski Reduction for Lattice-Reduction-Aided MIMO Transmission via MEX-Files*. Bachelor's thesis, Supervisor: Sebastian Stern; Reviewer: Prof. R. Fischer, Aug. 2019.
- [7] Roland Schenk. *Vergleich von reell- und komplexwertigen Algorithmen zur Gitterbasisreduktion in MIMO-Systemen*. Bachelor's thesis, Supervisor: Sebastian Stern; Reviewer: Prof. R. Fischer, Feb. 2018.

10 Conferences and Meetings

The following meetings were organized and/or hosted by members of our institute:

- ***Leopoldina Meeting***
February 26, 2018, Ulm University
- ***Electronic Speech Signal Processing ESSV 2018***
March 7–9, 2018, Ulm University
- ***ITG-Fachgruppe “Angewandte Informationstheorie”***
March 21, 2019, Ulm University
- ***ITG-Fachausschuss “KT1 Informations- und Systemtheorie”***
March 22, 2019, Ulm University

11 Academics

The members of the institute are active in various committees and at the university self-administration.

Prof. Martin Bossert

- Member of *Leopoldina, Deutsche Akademie der Wissenschaften*
- Member of *ITG-Fachausschuss KT1 Informations- und Systemtheorie*
- Head of *Promotionsausschuss Dr.-Ing.* (until Sept. 2019)
- Ombudsperson of *Ulm University*

Prof. Robert Fischer

- *Dean of Studies (Engineering)* of the Faculty of Engineering, Computer Science, and Psychology (until March 2019)
- Member of *Studienkommission "Elektrotechnik"*
- Member of *Promotionsausschuss Dr.-Ing.* (since Sept. 2019)
- Member of *kiz-Ausschuss*
- Member of *Selection Committee for the Argus Award*
- Member of *ITG-Fachausschuss KT1 Informations- und Systemtheorie*

Prof. Wolfgang Minker

- *Co-Director of the International Research Laboratory Multimodal Biometric and Speech Systems at ITMO University St. Petersburg, Russia*
- Member of *Admission Board for the Master Course "Informationssystemtechnik"* and the *Admission Board for the International Master Course "Communications Technology"*
- Member of *Habilitationsausschuss* (since Sept. 2019)

Dr. Werner Teich

- Academic Advisor *“Elektrotechnik”, “Informationssystemtechnik”, and “Communications Technology”*
- Erasmus Incoming Students Advisor
- Member of *Studienkommission “Informationssystemtechnik”*
- Member of *Fachprüfungsausschüsse der ingenieurwissenschaftlichen Studiengänge “Elektrotechnik”, “Communications Technology” and “Sensorsystemtechnik”*
- Member of *Fachprüfungsausschuss “Informationssystemtechnik”*
- Member of *Admission Boards for the Master Courses “Elektrotechnik”, “Informationssystemtechnik”, and the International Master Course “Communications Technology”*