Christoph Studer

School of ECE, Rhodes Hall 331
Cornell University
Ithaca, NY 14853, USA

e-mail: studer@cornell.edu
phone: +1 607 255 8218
www.csl.cornell.edu/~studer

Curriculum Vitae

Research interests

Digital very large-scale integration (VLSI) circuits and systems; signal and image processing; wireless communication systems; convex optimization; analysis of massive datasets.

Education

July 2009: Ph.D. in Information Technology and Electrical Engineering, ETH Zurich, Switzerland. Doctoral dissertation: "Iterative MIMO Decoding: Algorithm and VLSI Implementation Aspects," thesis advisors: Prof. W. Fichtner (Integrated Systems Laboratory, ETH Zurich) and Prof. H. Bölcskei (Communication Technology Laboratory, ETH Zurich).

Jan. 2006 – July 2009: Doctoral studies carried out jointly at the Integrated Systems Laboratory and the Communication Technology Laboratory, Department of Information Technology and Electrical Engineering, ETH Zurich, Switzerland.

Dec. 2005: Engineering diploma (equivalent to M.S. degree) in Information Technology and Electrical Engineering, ETH Zurich, Switzerland. Master's Thesis: "Sphere Decoding with Resource Constraints," carried out at the Information Systems Laboratory (with Prof. A. Paulraj), Department of Electrical Engineering, Stanford University, CA, USA.

Sept. 2000 – Dec. 2005: Undergraduate and graduate studies in Information Technology and Electrical Engineering, ETH Zurich, Switzerland.

Academic positions

Jan. 2014 – present: Assistant Professor at the School of Electrical and Computer Engineering at Cornell University, Ithaca, NY, USA.

Jan. 2014 – present: Adjunct Assistant Professor at the Department of Electrical and Computer Engineering at Rice University, Houston, TX, USA.

Sep. 2013 – Dec. 2014: Visiting Assistant Professor at the School of Electrical and Computer Engineering, Cornell University, NY, USA.

Jan. 2013 – Dec. 2014: Research Scientist in the Department of Electrical and Computer Engineering, Rice University, TX, USA.

Mar. 2011 – Dec. 2012: Postdoctoral Researcher at the Digital Signal Processing (DSP) group (with Prof. R. G. Baraniuk), Department of Electrical and Computer Engineering, Rice University, TX, USA.

Aug. 2009 – Feb. 2011: Postdoctoral Researcher at the Communication Technology Laboratory (with Prof. H. Bölcskei), Department of Information Technology and Electrical Engineering, ETH Zurich, Switzerland.

Jan. 2006 – July 2009: Research and Teaching Assistant at the Integrated Systems Laboratory and the Communication Technology Laboratory, Department of Information Technology and Electrical Engineering, ETH Zurich, Switzerland.

Jan. 2005 – July 2005: Visiting Researcher at the Information Systems Laboratory (with Prof. A. Paulraj), Department of Electrical Engineering, Stanford University, CA, USA.

Awards

2013: Shared the Swisscom/ICTnet Innovations Award 2013 on "Design of a Wideband Analog-to-Information Converter for Cognitive Radio" with D. Bellasi, L. Bettini, and C. Benkeser.

2013: IEEE Wireless Communication Letters Exemplary Reviewer.

2013: Best Demo Award at the IEEE International Symposium on Circuits and Systems (ISCAS) for the demonstration "Real-Time Audio Restoration using Sparse Signal Recovery."

2011: Fellowship for Advanced Researchers from the Swiss National Science Foundation (SNSF).

2011: ETH Medal for the doctoral dissertation on "Iterative MIMO Decoding: Algorithms and VLSI Implementation Aspects" carried out at the Department of Information Technology and Electrical Engineering, ETH Zurich, Switzerland.

2010: Shared the Swisscom/ICTnet Innovations Award 2010 on "VLSI Implementation of Soft-Input Soft-Output MMSE Parallel Interference Cancellation" with S. Fateh and D. Seethaler.

2010: Work (jointly with Prof. A. Burg and Prof. H. Bölcskei) on single tree-search sphere decoding was explicitly cited in the Vodafone Innovations Award 2010 given to Prof. H. Bölcskei.

2008: Best Student Paper Award of the IEEE International Symposium on Circuits and Systems (ISCAS) for the paper entitled "VLSI Architecture for Data-Reduced Steering Matrix Feedback in MIMO Systems."

2007: 1st place at the Student Paper Contest of the 41th Asilomar Conference on Signals, Systems, and Computers for the paper entitled "Matrix Decomposition Architecture for MIMO Systems: Design and Implementation Trade-Offs."

2005: ETH Medal for the M.S. Thesis on "Sphere Decoding with Resource Constraints" carried out at the Information Systems Laboratory (with Prof. A. Paulraj), Department of Electrical Engineering, Stanford University, CA, USA.

Academic work experience

Oct. 2013 – Dec. 2013: Guest lecturer for ELEC 547 "Computer Vision" and ELEC 301 "Introduction to Signals and Systems" at the ECE Dept. of Rice University, TX, USA.

Dec. 2011 – present: Supervisor of three Ph.D. Candidates on the design of a machine-learning-based personalized learning system at the ECE Dept. of Rice University, TX, USA.

Nov. 2011 – present: Mentor of Group Projects for ELEC 301 "Introduction to Signals and Systems" at the ECE Dept. of Rice University, TX, USA.

June 2009 – Dec. 2011: Main supervisor of Laboratory Courses for B.S. and M.S. students at the Communication Technology Laboratory, ETH Zurich, Switzerland.

Jan. 2006 – Feb. 2011: Supervisor of 13 M.S. Theses and 20 Semester Projects at the Integrated Systems Laboratory and the Communication Technology Laboratory, ETH Zurich, Switzerland; leading the specification, design, and testing of more than 15 application-specific integrated circuits (ASICs).

Jan. 2006 – June 2009: Main assistant for the lecture VLSI III (Fabrication and Verification of Highly Integrated Circuits). Organization of the exercises and the supervision of testing the fabricated application specific integrated circuits (ASICs).

Jan. 2006 – June 2009: Teaching assistant for VLSI I (Architectures of Highly Integrated Circuits) and VLSI II (Design of Highly Integrated Circuits). Short lectures on specific topics in IC design, exercise preparation, and examination preparation and grading.

Aug. 2005 – July 2008: Teaching Assistant at the Integrated Systems Laboratory, ETH Zurich for the Digital Audio practical training, projects, and seminar (PPS) course. Student mentoring for hardware (PCB design) and software development of DSP-based real-time audio-processing algorithms.

Industrial work experience

Apr. 2012 – Aug. 2012: Consultant for InView Technology Corporation, a Rice University spinoff located in Austin, TX, USA, developing compressive sensing-based imaging systems (real-time convex optimization algorithms for compressive-sensing reconstruction and assisting the design of a corresponding FPGA prototype).

Aug. 2008 – Jan. 2009: Consultant for Celestrius AG, an ETH spinoff specialized in the field of multi-antenna (MIMO) wireless communication (working on the development and silicon integration of high-performance data detection algorithms for IEEE 802.11n wireless LAN).

Sept. 2004 – Dec. 2004: Internship at Philips Semiconductors, Digital Baseband, Zurich, Switzerland. The work included the development of a company-wide system-level verification standard for cellular (GSM and EDGE) baseband system-on-chips.

Research grants

SNSF Grant PA00P2-134155: "Sparse-Signal Recovery with Statistical Models: Algorithms, Performance, and Implementation," (*given by* the Swiss National Science Foundation), Principal Investigator, funding $102,000, duration 3/1/2011–2/28/2013.

Professional activities

- Organizer of the workshop (with Prof. O. Edfors, Prof. L. van der Perre, and Prof. F. Rusek) on "Massive MIMO: From Theory to Practice" at the IEEE Global Communications Conference (GLOBECOM), Austin, TX, Dec. 2014.

- Organizer of special sessions: "Implementation Aspects for Full Duplex and Large-Scale MIMO Wireless Systems," at the 47th Asilomar Conference on Signals, Systems, and Computers (ACSSC), Pacific Grove, CA, USA, Nov. 2013; "Compressive Sensing," at the 46th Asilomar Conference on Signals, Systems, and Computers (ACSSC), Pacific Grove, CA, USA, Nov. 2012; "VLSI Architectures for LDPC Coding/Decoding," (with Prof. A. Burg) at the IEEE International Symposium on Circuits and Systems (ISCAS), Rio de Janeiro, Brazil, May 2011.

- Conference session chair: "Sparse Data Analysis" at the 51st Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL; "Compressive Sensing and Algorithms" at the IEEE International Symposium on Information Theory (ISIT), Cambridge, MA, USA, July 2012; "Advances in Compressive Sensing" at the 45th Asilomar Conference on Signals, Systems, and Computers (ACSSC), Pacific Grove, CA, USA, Nov. 2011.

- Technical committee member for the 2013 IEEE International Symposium on Circuits and Systems (ISCAS), the 2014 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), the 2014 IEEE Global Conference on Signal and Information Processing (GlobalSIP), the 2014 European Signal Processing Conference (EUSIPCO), and the 2014 IEEE Vehicular Technology Conference (VTC Fall).

- Guest editor (with Prof. J. R. Cavallaro and Prof. A. P. Burg) for "Algorithm and Implementation Aspects of Channel Codes and Iterative Receivers, " , EURASIP Journal on Wireless Communications, Dec. 2011.

- Committee member for the Student Paper Contest at the 45th Asilomar Conference on Signals, Systems, and Computers (ACSSC), Pacific Grove, CA, USA, Nov. 2011.

- Reviewer for the following journals: IEEE Communications Letters, IEEE Journal of Selected Topics in Signal Processing, IEEE Signal Processing Letters, IEEE Transactions on Circuits and Systems I, IEEE Transactions on Circuits and Systems II, IEEE Transactions on Communications, IEEE Transactions on Information Theory, IEEE Transactions on Signal Processing, IEEE Transactions on Vehicular Technology, IEEE Transactions on Very Large Scale Integration Systems, IEEE Transactions on Wireless Communications, IEEE Wireless Communication Letters *(2013 Exemplary Reviewer Award)* Elsevier Applied and Computational Harmonic Analysis, Elsevier Signal Processing, EURASIP Journal on Signal Processing, EURASIP Journal on Advances in Signal Processing, European Transactions on Telecommunications, Arabian Journal for Science and Engineering, IET Circuits, Devices and Systems, and Springer Journal of Signal Processing Systems.

- Reviewer for the following conferences: IEEE International Symposium on Information Theory (ISIT), IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), IEEE International Symposium on Circuits and Systems (ISCAS), IEEE Global Communications Conference (GLOBECOM), IEEE International Communications Conference (ICC), IEEE Vehicular Technology Conference (VTC), IEEE International Workshop on Signal Processing Advances for Wireless Communications (SPAWC), IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), IEEE International Symposium on Wireless Communication Systems (ISWCS), IEEE International Conference on Communications and Signal Processing (ICCSP), IEEE International Conference on Electronics, Circuits, and Systems (ICECS), IEEE International Symposium on Turbo Codes & Iterative Information Processing (ISTC), IEEE International Conference on Electrical Engineering, Computing Science and Automatic Control (CCE), IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM), IEEE Wireless Communications and Networking Conference (WCNC), European Conference on Signal Processing (EUSIPCO), and International ITG Workshop on Smart Antennas (WSA).

Participation in PhD Thesis committees

- Iker S. Polancos, "Detection and Decoding Algorithms of Multi-Antenna Diversity Techniques for Terrestrial DVB Systems," Dept. Electronics and Computer Science, University of Mondragón, Arrasate, Basque Country, Spain, Nov. 2010.

References

References available upon request.

Publications, Talks, and Patents

1. Book chapters

1.1 C. Studer, M. Wenk, and A. Burg, "VLSI Implementation of Hard- and Soft-Output Sphere Decoding for Wide-Band MIMO Systems," VLSI-SOC: Forward-Looking Trends in IC and Systems Design, IFIP Advances in Information and Communication Technology, J. L. Ayala, D. Atienza, and R. Reis, Eds., Springer Boston, Vol. 373, pp. 128–154, 2012 **(invited)**

2. Journal publications

2.1 C. Studer, T. Goldstein, W. Yin, and R. G. Baraniuk, "Democratic Representations," IEEE Transactions on Information Theory, *submitted*

2.2 D. Vats, C. Studer, A. S. Lan, L. Carin, and R. G. Baraniuk, "Test-Size Reduction via Sparse Factor Analysis," Journal of Educational Data Mining, *submitted*

2.3 A. E. Waters, C. Studer, and R. G. Baraniuk, "Collaboration-Type Identification in Educational Datasets," Journal of Educational Data Mining, *in press*

2.4 A. S. Lan, A. E. Waters, C. Studer, and R. G. Baraniuk, "Sparse Factor Analysis for Learning and Content Analytics," Journal of Machine Learning Research, 2014, *in press*

2.5 M. Wu, Bei Yin, G. Wang, C. Studer, and J. R. Cavallaro, "GPU Acceleration of a Configurable N-Way MIMO Detector for Wireless Systems," Journal of Signal Processing Systems, 2014, *in press*

2.6 M. Wu, Bei Yin, G. Wang, C. Dick, J. R. Cavallaro, and C. Studer, "Large-Scale MIMO Detection for 3GPP LTE: Algorithm and FPGA Implementation," IEEE Journal of Selected Topics in Signal Processing, 2014, *in press*

2.7 D. Bellasi, L. Bettini, C. Benkeser, T. Burger, Q. Huang, and C. Studer, "Monolithic Compressive-Sensing Wideband Analog-to-Information Converter," IEEE Journal on Emerging and Selected Topics in Circuits and Systems, Vol. 3, No. 4, pp. 552–565, Dec. 2013

2.8 C. Studer and R. G. Baraniuk, "Stable Restoration and Separation of Approximately Sparse Signals," Applied and Computational Harmonic Analysis, Sept. 2013

2.9 G. Pope, A. Bracher, and C. Studer, "Probabilistic Recovery Guarantees for Sparsely Corrupted Signals," IEEE Transactions on Information Theory, Vol. 59, No. 5, pp. 3104–3116, May 2013

2.10 C. Studer and E. G. Larsson, "PAR-Aware Large-Scale Multi-User MIMO-OFDM Downlink," IEEE Journal on Selected Areas in Communications, Vol. 31, No. 2, pp. 303–313, Feb. 2013

2.11 C. Studer, S. Fateh, C. Benkeser, and Q. Huang, "Implementation Trade-offs of Soft-Input Soft-Output MAP Decoders for Convolutional Codes," IEEE Transactions on Circuits and Systems I, Vol. 59 , No. 11, pp. 2774– 2783, Nov. 2012

2.12 P. Maechler, C. Studer, D. Bellasi, A. Maleki, A. Burg, N. Felber, H. Kaeslin, and R. G. Baraniuk, "VLSI Design of Approximate Message Passing for Signal Restoration and Compressive Sensing," IEEE Journal on Emerging and Selected Topics in Circuits and Systems, Vol. 2, No. 3, Oct. 2012

2.13 C. Studer, P. Kuppinger, G. Pope, and H. Bölcskei, "Recovery of Sparsely Corrupted Signals," IEEE Transactions on Information Theory, Vol. 58, No. 5, pp. 3115–3130, May 2012

2.14 D. Seethaler, J. Jaldén, C. Studer and H. Bölcskei, "On the Complexity Distribution of Sphere-Decoding," IEEE Transactions on Information Theory, Vol. 57, No. 9, pp. 5754–5768, Sept. 2011

2.15 C. Studer, S. Fateh, and D. Seethaler, "ASIC Implementation of Soft-Input Soft-Output MIMO Detection Using Parallel Interference Cancellation," IEEE Journal of Solid-State Circuits, Vol. 46, No. 7, pp. 1754–1765, July 2011 **(invited journal article)**

2.16 C. Studer, C. Benkeser, S. Belfanti, and Q. Huang, "Design and Implementation of a Parallel Turbo-Decoder ASIC for 3GPP-LTE," IEEE Journal of Solid-State Circuits, Vol. 46, No. 1, pp. 8–17, Jan. 2011 **(invited journal article; IEEE Xplore 19th most downloaded paper, Jan. 2011)**

2.17 C. Studer and H. Bölcskei, "Soft-Input Soft-Output Single Tree-Search Sphere Decoding," IEEE Transactions on Information Theory, Vol. 56, No. 10, pp. 4827–4842, Oct. 2010

2.18 C. Studer, A. Burg, and H. Bölcskei, "Soft-Output Sphere Decoding: Algorithms and VLSI Implementation," IEEE Journal on Selected Areas in Communications, Vol. 26, No. 2, pp. 290–300, Feb. 2008 **(since 2012, the STS-SD algorithm is part of MATLAB's Communications System Toolbox)**

3. Conference publications

3.1 A. S. Lan, C. Studer, and R. G. Baraniuk, "Time-Varying Learning and Content Analytics via Sparse Factor Analysis," Proc. 7th International Conference on Educational Data Mining (EDM), 2014, *to appear*

3.2 B. Yin, M. Wu, G. Wang, C. Dick, J. R. Cavallaro, and C. Studer, "A 3.8 Gb/s Large-Scale MIMO Detector for 3GPP LTE-Advanced," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2014, *to appear*

3.3 A. S. Lan, C. Studer, and R. G. Baraniuk, "Matrix Recovery from Quantized and Corrupted Measurements," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2014, *to appear*

3.4 A. E. Waters, C. Studer, and R. G. Baraniuk, "Bayesian Pairwise Collaboration Detection in Educational Datasets," 1st IEEE Global Conference on Signal and Information Processing (GlobalSIP), Austin, TX, USA, Dec. 2013 **(invited paper)**

3.5 B. Yin, M. Wu, C. Studer, and J. R. Cavallaro, "Full-Duplex in Large-Scale Wireless Systems," Proc. Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, Nov. 2013

3.6 M. Wu, G. Wang, B. Yin, C. Studer, and J. R. Cavallaro, "HSPA+/LTE-A Turbo Decoder on GPU and Multicore CPU," Proc. Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, Nov. 2013

3.7 E. L. Dyer, C. Studer, J. T. Robinson, and R. G. Baraniuk, "A Robust and Efficient Method to Recover Neural Events from Noisy and Corrupted Data," Proc. 6th International IEEE EMBS Neural Engineering Conference, San Diego, CA, Nov., 2013

3.8 C. Studer, G. Pope, P. Navarro, and R. G. Baraniuk, "Recovering Sparse Low-rank Blocks in Tandem Mass Spectrometry," Proc. 50th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, USA, Oct. 2013

3.9 D. Vats, C. Studer, A. S. Lan, L. Carin, and R. G. Baraniuk, "Test-size Reduction for Concept Estimation," Proc. 6th International Conference on Educational Data Mining (EDM), Memphis, TN, July 2013

3.10 A. S. Lan, C. Studer, A. E. Waters, and R. G. Baraniuk, "Joint Topic Modeling and Factor Analysis of Textual Information and Graded Response Data," Proc. 6th International Conference on Educational Data Mining (EDM), Memphis, TN, July 2013

3.11 A. S. Lan, C. Studer, A. E. Waters, and R. G. Baraniuk, "Tag-Aware Ordinal Sparse Factor Analysis for Learning and Content Analytics," Proc. 6th International Conference on Educational Data Mining (EDM), Memphis, TN, July 2013

3.12 D. Vats, C. Studer, and R. G. Baraniuk, "Test-size Reduction Using Sparse Factor Analysis," Proc. 10th International Conference on Sampling Theory and Applications (SampTA), Bremen, Germany, July 2013

3.13 G. Pope, C. Aubel, and C. Studer, "Learning Phase-Invariant Dictionaries," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Vancouver, BC, July 2013

3.14 E. L. Dyer, C. Studer, and R. G. Baraniuk, "Subspace Clustering with Dense Representations," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Vancouver, BC, July 2013

3.15 B. Yin, M. Wu, C. Studer, J. R. Cavallaro, and C. Dick, "Implementation Trade-offs for Linear Detection in Large-Scale MIMO Systems," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Vancouver, BC, July 2013

3.16 G. Pope, M. Lerjen, S. Müllener, S. Schläpfer, T. Walti, J. Widmer, and C. Studer, "Light Curtain Localization via Compressive Sensing," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Vancouver, BC, July 2013

3.17 A. Lan, A. E. Waters, and C. Studer, "Sparse Probit Factor Analysis for Learning Analytics," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Vancouver, BC, July 2013, **(invited paper)**

3.18 L. Xu, A. Sankaranarayanan, C. Studer, Y. Li, R. G. Baraniuk, and K. F. Kelly, "Multi-Scale Compressive Video Acquisition," Proc. Computational Optical Sensing and Imaging, Arlington VA, June 2013

3.19 M. Wu, Bei Yin, A. Vosoughi, C. Studer, and J. Cavallaro, "Approximate Matrix Inversion for High-Throughput Data Detection in the Large-Scale MIMO Uplink," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), Beijing, China, May 2013

3.20 P. Maechler, D. Bellasi, A. Burg, N. Felber, H. Kaeslin, and C. Studer, "Sparsity-Based Real-Time Audio Restoration," Proc. Conference on Design & Architectures for Signal & Image Processing (DASIP), Karlsruhe, Germany, Oct. 2012

3.21 N. Preyss, A. Burg, and C. Studer "Layered Detection and Decoding in MIMO Wireless Systems", Proc. Conference on Design & Architectures for Signal & Image Processing (DASIP), Karlsruhe, Germany, Oct. 2012 **(invited paper)**

3.22 C. Studer, W. Yin, and R. G. Baraniuk, "Signal Representations with Minimum ℓ_∞-Norm," Proc. 50th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, USA, Oct. 2012

3.23 C. Roth, C. Benkeser, C. Studer, G. Karakonstantis, and A. Burg, "Data Mapping for Unreliable Memories," Proc. 50th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, USA, Oct. 2012 **(invited paper)**

3.24 A. Bracher, G. Pope, and C. Studer, "Coherence-Based Probabilistic Recovery Guarantees for Sparsely Corrupted Signals," IEEE Information Theory Workshop (ITW), Lausanne, Switzerland, Sep. 2012

3.25 C. Studer and E. G. Larsson, "PAR-Aware Multi-user Pre-coder for the Large-Scale MIMO-OFDM Downlink," Proc. IEEE 9th International Symposium on Wireless Communication Systems (ISWCS), Paris, France, Aug. 2012 **(invited paper)**

3.26 C. Aubel, C. Studer, G. Pope, and H. Bölcskei, "Separation of Signals Sparsified by Morphologically Different Redundant Transforms," Proc. IEEE International Symposium on Information Theory, Cambridge, MA, USA, July. 2012

3.27 A. Sankaranarayanan, C. Studer, and R. G. Baraniuk, "CS-MUVI: Video Compressive Sensing for Spatial-Multiplexing Cameras," Proc. IEEE International Conference on Computational Photography (ICCP), Seattle, WA, USA, Apr. 2012

3.28 C. Studer and R. G. Baraniuk, "Dictionary Learning from Sparsely Corrupted or Compressed Signals," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Kyoto, Japan, Mar. 2012

3.29 G. Pope, C. Studer, and M. Baes, "Coherence-based Recovery Guarantees for Generalized Basis-Pursuit De-Quantizing," Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Kyoto, Japan, Mar. 2012

3.30 G. Pope, M. Baumann, C. Studer, and G. Durisi, "Real-Time Principal Component Pursuit," Proc. 45th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, Nov. 2011

3.31 C. Studer and R. G. Baraniuk, "Recovery Guarantees for Restoration and Separation of Approximately Sparse Signals," Proc. 49th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, USA, pp. 736–743, Sept. 2011

3.32 C. Studer, P. Kuppinger, G. Pope, and H. Bölcskei, "Sparse Signal Recovery from Sparsely Corrupted Measurements," Proc. IEEE International Symposium on Information Theory, St. Petersburg, Russia, pp. 1422–1426, Aug. 2011

3.33 C. Studer, M. Wenk, and A. Burg, "System-Level Implications of Residual Transmit-RF Impairments in MIMO Systems," Proc. IEEE 4th European Conference on Antennas and Propagation (EUCAP), Rome, Italy, pp. 2686–2689, Apr. 2011 **(invited paper)**

3.34 C. Roth, A. Cevrero, C. Studer, Y. Leblebici, and A. Burg, "Area, Throughput, and Energy-Efficiency Trade-offs in the VLSI Implementation of LDPC Decoders," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), Rio de Janeiro, Brazil, pp. 1772–1775, May 2011 **(invited paper)**

3.35 C. Roth, P. Meinerzhagen, C. Studer, and A. Burg, "A 15.8 pJ/bit/iter Quasi-Cyclic LDPC Decoder for IEEE 802.11n in 90 nm CMOS," Proc. IEEE Asian Solid-State Circuit Conference (A-SSCC), Beijing, China, pp. 1–4, Nov. 2010

3.36 C. Novak, C. Studer, A. Burg, and G. Matz, "The Effect of Unreliable LLR Storage on the Performance of MIMO-BICM," Proc. 44th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, pp. 736–740, Sept. 2010

3.37 M. Wenk, L. Bruderer, A. Burg, and C. Studer, "Area- and Throughput-Optimized VLSI Architecture of Sphere Decoding," Proc. IEEE/IFIP International Conference on VLSI and System-on-Chip (VLSI-SoC), Madrid, Spain, pp. 189–194, Sept. 2010

3.38 C. Studer, S. Fateh, and D. Seethaler, "A 757 Mb/s 1.5 mm^2 90 nm CMOS Soft-Input Soft-Output MIMO Detector for IEEE 802.11n," Proc. IEEE European Solid State Circuits Conference (ESSCIRC), Seville, Spain, pp. 520–533, Sept. 2010

3.39 L. Bruderer, C. Studer, M. Wenk, D. Seethaler, and A. Burg, "VLSI Implementation of a Low-Complexity LLL Lattice Reduction Algorithm for MIMO Detection," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), Paris, France, pp. 3745–3748, May 2010

3.40 B. Zimmermann and C. Studer, "FPGA-based Real-Time Acoustic Camera Prototype," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), Paris, France, pp. 1419-1421, May 2010

3.41 C. Studer, M. Wenk, and A. Burg, "MIMO Transmission with Residual Transmit-RF Impairments," Proc. International ITG Workshop on Smart Antennas (WSA), Bremen, Germany, pp. 189–196, Feb. 2010

3.42 C. Studer, C. Benkeser, S. Belfanti, and Q. Huang, "A 390 Mb/s 3.57 mm^2 3GPP-LTE Turbo Decoder ASIC in 0.13 µm CMOS," Dig. Techn. Papers, IEEE International Solid-State Circuits Conference (ISSCC), San Francisco, CA, USA, pp. 274–275, Feb. 2010

3.43 D. Seethaler, J. Jaldén, C. Studer and H. Bölcskei, "Tail Behavior of Sphere-Decoding Complexity in Random Lattices," Proc. IEEE International Symposium on Information Theory (ISIT), Seoul, Korea, pp. 729–733, June 2009

3.44 C. Studer, D. Seethaler, and H. Bölcskei, "Finite Lattice-Size Effects in MIMO Detection," Proc. 42th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, pp. 2032–2037, Oct. 2008 **(invited paper)**

3.45 C. Studer, N. Preyss, C. Roth, and A. Burg, "Configurable High-Throughput Decoder Architecture for Quasi-Cyclic LDPC Codes," Proc. 42th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, pp. 1137–1142, Oct. 2008 **(invited paper)**

3.46 P. Luethi, C. Studer, S. Duetsch, E. Zgraggen, H. Kaeslin, N. Felber, and W. Fichtner, "Gram-Schmidt-Based QR Decomposition for MIMO Detection: VLSI Implementation and Comparison," Proc. IEEE Asia Pacific Conference on Circuits and Systems (APCCAS), Macao, China, pp. 830–833, Nov. 2008

3.47 C. Studer and H. Bölcskei, "Soft-Input Soft-Output Sphere Decoding," Proc. IEEE International Symposium on Information Theory (ISIT), Toronto, Canada, pp. 2007–2011, July 2008

3.48 C. Studer, P. Luethi, and W. Fichtner, "VLSI Architecture for Data-Reduced Steering Matrix Feedback in MIMO Systems," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), Seattle, WA, USA, pp. 300–303, May 2008 **(Best Student Paper Award)**

3.49 C. Senning, C. Studer, P. Luethi, and W. Fichtner, "Hardware-Efficient Steering Matrix Computation Architecture for MIMO Communication Systems," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), Seattle, WA, USA, pp. 304–307, May 2008

3.50 C. Studer, P. Blösch, P. Friedli, and A. Burg, "Matrix Decomposition Architecture for MIMO Systems: Design and Implementation Trade-Offs," Proc. 41th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, pp. 1986–1990, Nov. 2007 **(invited paper; 1st place at Student Paper Contest)**

3.51 D. Perels, C. Studer, and W. Fichtner, "Implementation of a Low-Complexity Frame-Start Detection Algorithm for MIMO Systems," Proc. IEEE International Symposium on Circuits and Systems (ISCAS), New Orleans, LA, USA, pp. 1903-1906, May 2007

3.52 C. Hess, M. Wenk, A. Burg, P. Luethi, C. Studer, N. Felber, and W. Fichtner, "Reduced-Complexity MIMO Detector with Close-to ML Error Rate Performance," Proc. ACM Great Lakes Symposium on VLSI, Stresa, Italy, pp. 200–203, Mar. 2007

3.53 M. Wenk, A. Burg, M. Zellweger, C. Studer, and W. Fichtner, "VLSI Implementation of the List Sphere Algorithm," Proc. 24th NORCHIP Conference, Linköping, Sweden, pp. 107–110, Nov. 2006

3.54 C. Studer, M. Wenk, A. Burg, and H. Bölcskei, "Soft-Output Sphere Decoding: Performance and Implementation Aspects," Proc. 40th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, pp. 2071–2076, Oct. 2006 **(invited paper)**

3.55 C. Studer, A. Burg, and W. Fichtner, "A Unification of ML-Optimal Tree-Search Decoders," Proc. 40th Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, pp. 2185–2189, Oct. 2006

3.56 A. Burg, M. Borgmann, M. Wenk, C. Studer, and H. Bölcskei, "Advanced Receiver Algorithms for MIMO Wireless Communications," Proc. Design Automation and Test Europe Conference (DATE), pp. 593–598, Mar. 2006 **(invited paper)**

4. Theses

4.1 C. Studer, "Iterative MIMO Decoding: Algorithm and VLSI Implementation Aspects," Ph.D. dissertation, Department of Information Technology and Electrical Engineering, ETH Zurich, Zurich, Switzerland, Series in Microelectronics, Vol. 202, Hartung-Gorre Verlag Konstanz, July 2009 **(ETH Medal for doctoral dissertation)**

4.2 C. Studer, "Sphere Decoding with Resource Constraints," M.S. Thesis, Department of Information Technology and Electrical Engineering, ETH Zurich, Zurich, Switzerland, Oct. 2005 **(ETH Medal for M.S. Thesis)**

5. Press

5.1 Projects Magazine on Science, Technology, and Innovation, "Sparse Signal Recovery: Novel ways of restoring damaged signals," Insight Publishers Ltd, No. 31, Apr. 2013

6. Live demonstrations, workshop papers, and extended abstracts

6.1 E. Dyer, C. Studer, and R. G. Baraniuk, "Subspace Clustering Reloaded: Sparse vs. Dense Representations," Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop, July 2013

6.2 A. Taeb, A. Maleki, C. Studer, and R. G. Baraniuk, "Maximin Analysis of Message Passing Algorithms for Recovering Block Sparse Signals," Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop, July 2013

6.3 G. Pope, C. Studer, P. Navarro, and R. G. Baraniuk, "Recovering Sparse Low-rank Blocks in Mass Spectrometry," Signal Processing with Adaptive Sparse Structured Representations (SPARS) workshop, July 2013

6.4 D. Bellasi, P. Maechler, A. Burg, N. Felber, and C. Studer, "Real-Time Audio Restoration using Compressive Sensing," IEEE International Symposium on Circuits and Systems (ISCAS), Beijing, China, May 2013 **(Best Demo Award)**

6.5 A. Lan, A. E. Waters, C. Studer, and R. G. Baraniuk, "Learning Analytics via Sparse Factor Analysis," Neural Information Processing Systems (NIPS), in Personalizing Education with Machine Learning Workshop, Lake Tahoe, NV, Dec. 2012

6.6 A. E. Waters, A. Lan, C. Studer, and R. G. Baraniuk, "Sparse Factor Analysis for Learning Analytics," Neural Information Processing Systems (NIPS), in Deep Learning & Feature Extraction Workshop, Lake Tahoe, NV, Dec. 2012

6.7 J. V. Shi, A. Sankaranarayanan, C. Studer, and R. G. Baraniuk, "Video Compressive Sensing for Dynamic MRI," 21st Annual Computational Neuroscience Meeting (CNS), Atlanta, GA, USA, July 2012

6.8 A. E. Waters, A. Lan, C. Studer, and R. G. Baraniuk, "Sparse Factor Analysis for Cognitive Tutoring," The Learning Workshop, Snowbird, UT, USA, April. 2012

6.9 B. Zimmermann and C. Studer, "FPGA-based Real-Time Acoustic Camera Prototype," IEEE International Symposium on Circuits and Systems (ISCAS), Paris, France, May 2010

7. Invited talks and poster presentations

7.1 C. Studer, "Landing a Faculty Position," talk at Rice University, TX, USA, Oct. 2013

7.2 C. Studer, "Sparse Signal and Image Recovery: Theory, Algorithms, and VLSI Circuits," talk at Washington University of St. Louis, MO, USA, Mar. 2013

7.3 C. Studer, "Sparse Signal and Image Recovery: Theory, Algorithms, and VLSI Circuits," talk at University of Pennsylvania, PA, USA, Mar. 2013

7.4 C. Studer, "Sparse Signal and Image Recovery: Theory, Algorithms, and VLSI Circuits," talk at Cornell University, NY, USA, Mar. 2013

7.5 C. Studer, "Sparse Signal and Image Recovery: Theory, Algorithms, and VLSI Circuits," talk at University of Maryland, MD, USA, Mar. 2013

7.6 C. Studer, "Wideband Compressive Sensing: From Theory to VLSI Circuits," talk at University California Los Angeles, CA, USA, Feb. 2013

7.7 C. Studer, "Wideband Analog-to-Information Conversion: From Theory to VLSI Circuits," talk at Johns Hopkins University, MD, USA, Feb. 2013

7.8 C. Studer, "Wideband Analog-to-Information Conversion: From Theory to VLSI Circuits," talk at University of Wisconsin Madison, WI, USA, Feb. 2013

7.9 C. Studer, "Wideband Analog-to-Information Conversion: From Theory to VLSI Circuits," talk at University of California Santa Barbara, CA, USA, Jan. 2013

7.10 C. Studer, "VLSI Circuits and Systems for Signal Recovery and Compressive Sensing," talk at Rheinisch-Westfälische Technische Hochschule Aachen, Germany, Sept. 2012

7.11 C. Studer, "Algorithms and VLSI Circuits for Wireless Communication and Signal Processing," talk at Télécom Bretagne, Brest, France, June 2012

7.12 C. Studer, "Sparse Signal Recovery: From Theory to VLSI Circuits," talk at the Department of Information Technology and Electrical Engineering (D-ITET), ETH Zürich, Zürich, Switzerland, Apr. 2012

7.13 C. Studer, "Iterative MIMO Decoding: From Theory to VLSI Circuits," talk at the Department of Electrical Engineering (ISY), Linköping University, Linköping, Sweden, Nov. 2011

7.14 C. Studer, "ASIC Implementation of Soft-Input Soft-Output MIMO Detection Using MMSE Parallel Interference Cancellation," talk at Department of Electrical and Computer Engineering, Rice University, TX, USA, May 2011

7.15 C. Studer,"MIMO Communication and the Intricacies of RF Impairments," talk at the Electronics and Computing Department, University of Mondragon, Mondragon, Spain, Jan. 2011

7.16 S. Fateh, C. Studer, and D. Seethaler, "VLSI Implementation of Soft-Input Soft-Output MMSE Parallel Interference Cancellation," talk at Swisscom AG, Berne, Switzerland, Dec. 2010 **(Swisscom and ICTnet Innovations Award 2010)**

7.17 A. Burg and C. Studer, "MIMO Detection and the Intricacies of Transmit-RF Impairments," talk at Lucent/Bell-Labs, Stuttgart, Germany, Nov. 2010

7.18 C. Studer, "Iterative Data Recovery for MIMO Communication and Compressed Sensing," talk at the Department of Electrical Engineering (ISY), Linköping University, Linköping, Sweden, Sept. 2010

7.19 C. Studer, M. Wenk, A. Burg, and H. Bölcskei, "Single Tree-Search Sphere Decoding: Algorithm and Implementation," poster presentation at the EU-US Frontiers of Engineering Symposium, Cambridge, UK, Sept. 2010

7.20 C. Studer, "Sphere Decoding with Resource Constraints," talk at Beceem Communications Inc., Santa Clara, CA, USA, June 2005

8. Patents

8.1 R. G. Baraniuk, A. Sankaranarayanan, J. V. Shi, and C. Studer, "Video Compressive Sensing for Dynamical Medical Imaging," Rice University, USA, No. 13/952,353, July 2013, *filed*

8.2 R. G. Baraniuk, A. S. Lan, C. Studer, and A. E. Waters, "Sparse Factor Analysis for Learning Analytics and Content Analytics," Rice University, USA, No. 61/790,727, Mar. 2013, *filed*

8.3 J. R. Cavallaro, C. Dick, C. Studer, A. Vosoughi, M. Wu, and B. Yin, "Approximate Matrix Inversion for Low-Complexity Detection and Precoding in Large-Scale MIMO," Rice University, USA, and Xilinx, USA, Aug. 2012, *filed*

8.4 E. G. Larsson, S. Mohammed, and C. Studer, "Transmitter Part for a Transfer System and a Method for Signal Processing in such System," Linköping, Sweden, June 2012, *filed*

8.5 H. Bölcskei, A. Burg, and C. Studer, "Computation of Extrinsic Information in a Branch-and-Bound Detector," PCT/CH2008/000298, July 2008

8.6 H. Bölcskei, A. Burg, and C. Studer, "Modified Distance-Increments for Branch-and-Bound Detection," PCT/CH2008/000290, July 2008