Clayton Schoeny

Data Scientist

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Education

University of California, Los Angeles (UCLA):

2014–Current **Ph.D. Electrical and Computer Engineering**.

- Expected Graduation: June, 2018
- Dissertation: *Coding for Future Large-Scale Data Systems*
- Graduate Student Researcher: Laboratory for Robust Information Systems (LORIS)
- Research: Coding theoretic methods for next-generation storage systems
- GPA: 4.0

2012–2014 **M.S. Electrical Engineering**.

- Master's Thesis: *Efficient File Synchronization*
- Graduate Student Researcher: Laboratory for Robust Information Systems (LORIS)
- Focus: Communication Systems

2007–2012 **B.S. Electrical Engineering**.

- Minor: Mathematics
- Senior Design Project: Interactive Speech Recognition
- Technical Breadth: Technology Management
- Latin Honors: *Cum Laude*

Honors & Awards

2017–2018 Distinguished PhD Dissertation in Signals & Systems Award

2018 Best Paper Award: IEEE Workshop on Silicon Errors in Logic – System Effects

2018 Memorable Paper Award Finalist: Non-Volatile Memories Workshop

2017–2018 UCLA Dissertation Year Fellowship

2017 Best Paper Award: ACM/IEEE Embedded Systems Week

2016–2017 Qualcomm Innovation Fellowship Winner

2016 Best Paper Award: IEEE Workshop on Silicon Errors in Logic – System Effects

2015–2016 Qualcomm Innovation Fellowship Finalist

2014–2015 Henry Samueli Excellence in Teaching Award
–Teaching Assistant: Spring 2015 EE132A Introduction to Communication Systems

Computer Skills

Preferred Python: Pandas, NumPy, SciPy, Scikit-Learn, NetworkX, Matplotlib, Seaborn, Bokeh, SQLAlchemy, Jupyter

Certification	DataCamp: Data Science Track (20 courses)
Experienced	MATLAB, C++, Excel, LaTeX
Advanced	Probability, Linear Algebra, Combinatorics, Calculus, Statistics, Information Theory

Industry Experience

Jun-Sep 2015 **Space and Naval Warfare Systems Command (SPAWAR)**, *Point Loma, CA*.
Naval Research Enterprise Internship—Command and Control
- Established fundamental bounds and constructed an asymptotically optimal error-correcting code (for channels with burst deletions) for the US Navy to efficiently synchronize command and control data in disconnected, intermittent, and low-bandwidth environments.

Jun-Sep 2013 **DIRECTV**, *El Segundo, CA*.
Apr-Sep 2012 Internship—Space and Communications, Video Systems Engineering
- Created a dynamic spreadsheet to track vital characteristics of network channels in 200+ local TV markets.
- Modeled the probabilistic system-level effects of a proposed bit-rate harvesting scheme.
- Diagrammed the transition of a broadcast center from ATM to IP architecture.

Jun-Nov 2011 **The Aerospace Corporation**, *El Segundo, CA*.
Jun-Sep 2010 Internship—Communication Systems Engineering Department
- Wrote MATLAB and C++ scripts to analyze the performance of the Wideband Global SATCOM System; presented to the Air Force with recommendations for future actions.
- Developed code that modeled a hacker attempting to interfere with secure communications; successfully implemented into larger software platform.

Publications and Talks

Journal Articles

2018 **C. Schoeny**, F. Sala, M. Gottscho, I. Alam, P. Gupta, L. Dolecek, "Context-Aware Resiliency: Unequal Message Protection for Random-Access Memories," *IEEE Transactions on Information Theory* (submitted).

2018 S. Yang, **C. Schoeny**, L. Dolecek, "Theoretical Bounds and Constructions of Codes in the Generalized Cayley Metric," *IEEE Transactions on Information Theory* (submitted).

2018 Z. Chen, **C. Schoeny**, L. Dolecek, "Hamming Distance Computation in Unreliable Resistive Memory," *IEEE Transactions on Communications* (accepted).

2017 M. Gottscho, I. Alam, **C. Schoeny**, L. Dolecek, P. Gupta, "Low-Cost Memory Fault Tolerance for IoT Devices," *ACM Transactions on Embedded Computing Systems – Special Issue ESWEEK 2017,* vol. 16, no 5., Oct. 2017 (Best paper award).

2017 **C. Schoeny**, A. Wachter-Zeh, R. Gabrys, E. Yaakobi, "Codes Correcting a Burst of Deletions or Insertions," *IEEE Transactions on Information Theory* vol. 63, no 4., Jan. 2017.

2017 F. Sala, R. Gabrys **C. Schoeny**, L. Dolecek, "Exact Reconstruction From Insertions in Synchronization Codes," *IEEE Transactions on Information Theory*, vol. 63, no 4., Jan. 2017.

2017 F. Sala, **C. Schoeny**, S. Kabir, D. Divsalar, L. Dolecek, "On Nonuniform Noisy Decoding for LDPC Codes with Application to Radiation-Induced Errors," *IEEE Transactions on Communications*, vol. 65, no 4., Jan. 2017.

2016 F. Sala, **C. Schoeny**, N. Bitouze, L. Dolecek, "Synchronizing Files Under a Large Number of Edits," *IEEE Transactions on Communications*, vol. 64, no. 6, Jun. 2016.

Conference Publications

2018 I. Alam*, **C. Schoeny**, L. Dolecek, P. Gupta, "Parity++: Lightweight Error Correction for Last Level Caches," in *Proc IEEE/IFIP Int. Conf. on Dependable Systems and Networks (DSN)*, Luxembourg City, Luxembourg, Jun. 2018.

2017 **C. Schoeny***, F. Sala, M. Gottscho, I. Alam, P. Gupta, L. Dolecek, "Context-Aware Resiliency: Unequal Message Protection for Random-Access Memories," in *Proc. IEEE Information Theory Workshop (ITW)*, Kaohsiung, Taiwan, Nov. 2017.

2017 S. Yang*, **C. Schoeny**, L. Dolecek, "Order-Optimal Permutation Codes in the Generalized Cayley Metric," in *Proc. IEEE Information Theory Workshop (ITW)*, Kaohsiung, Taiwan, Nov. 2017.

2017 **C. Schoeny***, F. Sala, L. Dolecek, "Novel Combinatorial Coding Results for DNA Sequencing and Data Storage," in *Proc. IEEE Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, Oct. 2017.

2017 Z. Chen*, **C. Schoeny**, Y. Cassuto, L. Dolecek, "A Coding Scheme for Reliable In-Memory Hamming Distance Computation," in *Proc. IEEE Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, Oct. 2017.

2016 F. Sala, **C. Schoeny**, S. Kabir, D. Divsalar, L. Dolecek*, "Flash Memories in High Radiation Environments: LDPC Decoder Study," in *Proc. IEEE Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, Nov. 2016.

2016 A. Reisizadehmobarakeh, **C. Schoeny**, C.-Y. Tsai, L. Dolecek*, "Approximate File Synchronization: Upper Bounds and Interactive Algorithms," in *Proc. IEEE Inf. Theory Workshop (ITW)*, Cambridge, UK, Sep. 2016.

2016 **C. Schoeny***, A. Wachter-Zeh, R. Gabrys, E. Yaakobi, "Codes Correcting a Burst of Deletions or Insertions," in *Proc. IEEE Int. Symp. Inf. Theory (ISIT)*, Barcelona, Spain, Jul. 2016.

2016 A. Hareedy*, C. Lanka, **C. Schoeny**, L. Dolecek, "The Weight Consistency Matrix Framework for General Non-binary LDPC Code Optimization: Applications in Flash Memories," in *Proc. IEEE Int. Symp. Inf. Theory (ISIT)*, Barcelona, Spain, Jul. 2016.

2016 F. Sala*, R. Gabrys, **C. Schoeny**, K. Mazooji, L. Dolecek, "Exact Sequence Reconstruction for Insertion-Correcting Codes," in *Proc. IEEE Int. Symp. Inf. Theory (ISIT)*, Barcelona, Spain, Jul. 2016.

2016 M. Gottscho*, **C. Schoeny**, L. Dolecek, P. Gupta, "Software-Defined Error-Correcting Codes," in *Proc IEEE/IFIP Int. Conf. on Dependable Systems and Networks (DSN)*, Toulouse, France, Jun.-Jul. 2016.

2016 P. Schläfer*, C. Huang, **C. Schoeny**, C. Weis, Y. Li, N. Wehn, L. Dolecek, "Error Resilience and Energy Efficiency: an LDPC Decoder Design Study," in *Proc. IEEE Design, Automation & Test in Europe (DATE)*, Dresden, Germany, Mar. 2016.

2015 F. Sala*, **C. Schoeny**, D. Divsalar, L. Dolecek, "Asymmetric ECCs for Flash in High-Radiation Environments," in *Proc. IEEE Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, Nov. 2015.

2015 **C. Schoeny***, F. Sala, L. Dolecek, "Analysis and Coding Schemes for the Flash Normal-Laplace Mixture Channel," in *Proc. IEEE Int. Symp. Inf. Theory (ISIT)*, Hong Kong, Jun. 2015.

2015 F. Sala*, **C. Schoeny**, D. Divsalar, L. Dolecek, "Asymmetric Error-Correcting Codes for Flash Memories in High-Radiation Environments," in *Proc. IEEE Int. Symp. Inf. Theory (ISIT)*, Hong Kong, Jun. 2015.

2015 F. Sala*, R. Gabrys, **C. Schoeny**, L. Dolecek, "Three Novel Combinatorial Theorems for the Insertion/Deletion Channel," in *Proc. IEEE Int. Symp. Inf. Theory (ISIT)*, Hong Kong, Jun. 2015.

2014 **C. Schoeny***, N. Bitouze, F. Sala, L. Dolecek, "Efficient File Synchronization: Extensions and Simulations," in *Proc. IEEE Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, Nov. 2014.

Book Chapters

2016 F. Sala, **C. Schoeny**, L. Dolecek, "Advanced Algebraic and Graph-Based ECC Schemes for Flash Memories," in *3D Flash Memories*, Rino Micheloni, Ed. Springer, 2016, pp. 321 – 348.

Workshops & Talks

2018 I. Alam*, **C. Schoeny**, L. Dolecek, P. Gupta, "Parity++: Lightweight Error Correction for Last Level Caches," *IEEE Workshop on Silicon Errors in Logic - System Effects (SELSE)*, Boston, MA, Mar. 2018 (Best paper award).

2018 S. Yang*, **C. Schoeny**, L. Dolecek, "Order-Optimal Permutation Codes in the Generalized Cayley Metric," *Non-Volatile Memories Workshop (NVMW)*, San Diego, CA, Mar. 2018 (Best paper finalist).

2017 **C. Schoeny***, M. Gottscho, I. Alam* "Software-Defined Error-Correcting Codes," *Qualcomm Innovation Fellowship Winners' Day*, San Diego, CA, Sep. 2017.

2017 **C. Schoeny***, M. Gottscho*, "Software-Defined Error-Correcting Codes," *UCLA Electrical Engineering Annual Research Review (ARR)*, Los Angeles, CA, Apr. 2017.

2017 F. Sala, **C. Schoeny**, S. Kabir*, D. Divsalar, L. Dolecek, "Modeling the Effects of Radiation Induced Soft Errors on LDPC Decoding," *Non-Volatile Memories Workshop (NVMW)*, San Diego, CA, Mar. 2017.

2016 **C. Schoeny***, M. Gottscho*, "Software-Defined Error-Correcting Codes," *Qualcomm Innovation Fellowship Winners' Day*, San Diego, CA, Sep. 2016.

2016 F. Sala, **C. Schoeny**, L. Dolecek*, "Approximate and Noisy Computing: Connections to the Information-Theory World," *Workshop on Approximate Computing Across the Stack (WAX)*, Atlanta, GA, Apr. 2016.

2016 M. Gottscho*, **C. Schoeny**, L. Dolecek, P. Gupta, "Software-Defined Error-Correcting Codes," *IEEE Workshop on Silicon Errors in Logic - System Effects (SELSE)*, Austin, TX, Mar. 2016 (Best paper award).

2016 F. Sala, **C. Schoeny***, D. Divsalar, L. Dolecek, "Error-Correcting Codes for Radiation-Induced Error Patterns in Flash Memories," *Non-Volatile Memories Workshop (NVMW)*, San Diego, CA, Mar. 2016.

2016 **C. Schoeny***, M. Gottscho*, "Software-Defined Error-Correcting Codes," *Qualcomm Innovation Fellowship Finalists Presentation*, San Diego, CA, Mar. 2016.

2016 **C. Schoeny***, F. Sala, L. Dolecek, "Coding for the Limited Permutation Channel," *UCLA Electrical Engineering Annual Research Review (ARR)*, Los Angeles, CA, Feb. 2016.

2015 **C. Schoeny***, F. Sala*, "Coding Techniques for Next-Generation 3-D Flash Memories," *Qualcomm Innovation Fellowship Finalists Presentation*, San Diego, CA, Mar. 2015.

2015 **C. Schoeny***, B. Amiri, A. Hareedy, L. Dolecek, "Quasi-Cyclic Non-Binary LDPC Codes for MLC NAND Flash Memory," *Non-Volatile Memories Workshop (NVMW)*, San Diego, CA, Mar. 2015.

Poster Presentations

2018 Z. Chen*, **C. Schoeny**, L. Dolecek, "Hamming Distance Computation in Unreliable Resistive Memory," *Non-Volatile Memories Workshop (NVMW)*, San Diego, CA, Mar. 2018.

2016 D. Divsalar, L. Dolecek, M. Cheng, F. Sala*, **C. Schoeny***, S. Kabir, "Breaking the Limitations of Radiation-Hardened Devices," *JPL Research Poster Conference*, Pasadena, CA, Nov. 2016.

2015 **C. Schoeny***, N. Bitouze, F. Sala, L. Dolecek, "Synchronizing Files Under a Large Number of Edits," *UCLA Electrical Engineering Annual Research Review (ARR)*, Los Angeles, CA, Feb. 2015.

2014 **C. Schoeny***, L. Dolecek, "Non-Binary LDPC Codes for MLC NAND Flash Memory", *Flash Memory Summit*, San Jose, CA, Aug. 2014.

Professional Services – Peer-Reviewer

2018 IEEE International Symposium on Information Theory and Its Applications (ISITA)

2017–2018 IEEE Transactions on Multi-Scale Computing Systems

2017–2018 Discrete Applied Mathematics

2017–2018 Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences

2016–2018 IEEE Transactions on Information Theory

2016–2018 IEEE International Symposium on Information Theory (ISIT)

2015–2018 IEEE Transactions on Communications

Leadership and Activities

HKN	Workshop Chair, Mentorship Chair, Senior Advisor
Membership	IEEE, Engineering Society of UCLA
Tutoring	Math, Physics, Engineering
Martial Arts	Muay Thai, Tae Kwon Do
Soccer	Captain — High school, competitive club, intramural, city league
Government	President of dormitory floor student government

Relevant Courses

Electrical Engineering

Information Theory
Channel Coding Theory
Graphs and Network Flows
Inference on Graphs
Telecommunication Networks
Logic Design of Digital Systems
Digital Signal Processing
Digital Communication Systems
Principles of Feedback Control
Modern Data Storage Systems

Mathematics

Probability Theory
Stochastic Processes
Game Theory
Statistics
Linear Algebra
Multivariable Calculus
Linear Programming
Complex Analysis
Matrix Analysis
Applied Numerical Computing