

Eva C. Song

CONTACT INFORMATION

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U.S. Permanent Resident

EDUCATION

Princeton University, NJ September 2010-October 2015
Ph.D., Electrical Engineering, received October 2015
Dissertation: A New Approach to Lossy Compression and Applications to Security
Advisors: Paul Cuff, H. Vincent Poor
Thesis committee: Sergio Verdú, Emmanuel Abbe, Prateek Mittal, Paul Cuff, H. Vincent Poor
M.A., Electrical Engineering, received September 2012 **GPA** 3.83/4.0
Carnegie Mellon University, Pittsburgh, PA September 2007-December 2009
B.S., Electrical and Computer Engineering **GPA** 3.93/4.0

PROFESSIONAL EXPERIENCE

Huawei Research NJ, USA
Staff Researcher in Radio Algorithm Team, Wireless July 2016-present

- Conducting research and developing algorithms for wireless communications

Amazon NJ, USA
Software Development Engineer, Audible November 2015-June 2016

- Investigated, developed, and maintained backend work of audio and metadata ingestion for audio books using Java, Spring, and AWS tools
- Designed and developed automated cover art/image ingestion for audio books to improve efficiency

Alcatel-Lucent NJ, USA
Intern, Bell Labs Research June-September 2012

- Jointly worked with Communication and Signal Processing group and Optics group on MIMO optical communication security project
- Studied and derived fundamental mathematical limits in multimode fiber communication in presence of eavesdropping
- Applied theoretical results to physical model and wrote MATLAB code to simulate

DAT Group Beijing, China
Intern, Software June-August 2008

- Developed banking and public transportation applications for smart card and reader using C++
- Wrote ATM demo programs to perform ATM transaction using smart card

TEACHING EXPERIENCE

TA COS-126 General Computer Science	Princeton University	FALL 2012
TA ELE-301 Circuits and Signal Processing	Princeton University	FALL 2011
TA 18-300 Fundamentals of Electromagnetism	Carnegie Mellon University	FALL 2009
TA 18-220 Electrical Engineering	Carnegie Mellon University	FALL 2008

RESEARCH EXPERIENCE

Department of Electrical Engineering, Princeton University
Joint Source-Channel Coding October 2014-October 2015

- Studied joint source-channel coding in multi-user communication network
- Analyzed joint source-channel coding schemes in rate-distortion based secrecy communication systems

Lossy Compression June 2013-October 2015

- Studied the use of likelihood encoder in various source coding problems
- Studied the fundamental limit of source compression with side information under reliability and secrecy constraints

- Sentiment Analysis* February-May 2012
- Studied topic models in text analytics
 - Mined Amazon reviews using a Latent Dirichlet allocation (LDA) model and predicted star ratings from text sentiment using a regression model
- Source Channel Secrecy* July 2011-June 2013
- Studied secrecy of Gaussian source compression
 - Studied the fundamental limit of transmitting messages over noisy broadcast channel under certain reliability and security constraints
 - Studied source coding limit with presence of eavesdropper and secret key sharing between transmitter and intended receiver using rate-distortion theory
 - Explored joint source-channel coding over broadcast channel to achieve certain level of distortion to the eavesdropper that has causal information about the source

Department of Electrical and Computer Engineering, Carnegie Mellon University
Research Assistant, full-time January-June 2010

- Data Storage Systems Center, undergraduate research*
- Modeled and analyzed dynamic performance of microactuator for application of hard disk drive using COMSOL and MATLAB

Damage Detection in Pipeline September-December 2009
Signal Processing, undergraduate research Advisor: José Moura

- Implemented time reversal algorithm in MATLAB and performed experimental measurements

Thermo-Optical Modeling of Near Field Optical Sources January-June 2009
Data Storage Systems Center, undergraduate research Advisor: James Bain

- Modeled and analyzed near field optical sources using COMSOL and MATLAB for application in heat assisted magnetic recording (HAMR)

PUBLICATIONS

- E. C. Song**, P. Cuff and H. V. Poor, “The Likelihood Encoder for Lossy Compression,” *IEEE Trans. on Information Theory*, vol. 62, no. 4, pp. 1836-1849, April 2016
- E. C. Song**, P. Cuff and H. V. Poor, “Joint Source-Channel Secrecy Using Hybrid Coding,” *IEEE International Symposium on Information Theory*, Hong Kong. June 2015
- E. C. Song**, P. Cuff and H. V. Poor, “A Rate-Distortion Based Secrecy System with Side Information at the Decoders,” *IEEE Allerton Conference on Communication, Control, and Computing*, Allerton, IL. October 2014
- E. C. Song**, P. Cuff and H. V. Poor, “The Likelihood Encoder for Lossy Source Compression,” *IEEE International Symposium on Information Theory*, Honolulu, HI. June 2014
- E. C. Song**, E. Soljanin, P. Cuff, H. V. Poor and K. Guan, “Rate-Distortion-Based Physical Layer Secrecy with Applications to Multimode Fiber,” *IEEE Trans. on Communications*, vol. 62, pp. 1080-1090, March 2014
- E. C. Song**, P. Cuff and H. V. Poor, “A Bit of Secrecy for Gaussian Source Compression,” *IEEE International Symposium on Information Theory*, Istanbul, Turkey. July 2013
- P. Cuff and **E. C. Song**, “The Likelihood Encoder for Source Coding,” *IEEE Information Theory Workshop*, Seville, Spain. September 2013
- C. Schieler, **E. C. Song**, P. Cuff and H. V. Poor, “Source-Channel Secrecy with Causal Disclosure,” *IEEE Allerton Conference on Communication, Control, and Computing*, Allerton, IL. October 2012
- K. C. Guan, **E. C. Song**, E. Soljanin, P. J. Winzer and A. M. Tulino, “Physical Layer Security in Space-Division Multiplexed Fiber Optic Communications,” *IEEE Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA. November 2012

INVITED
PRESENTATIONS

- E. C. Song**, “A New Approach to Lossy Compression and Applications to Security,” *Rising Stars*

in *EECS, Workshop at MIT*, Cambridge, MA. November 2015

E. C. Song, P. Cuff and H. V. Poor, “The Likelihood Encoder with Applications to Lossy Compression and Secrecy,” *IEEE Information Theory and Applications Workshop*, La Jolla, CA. February 2015

E. C. Song, P. Cuff and H. V. Poor, “A Bit of Secrecy for Gaussian Source Compression,” *North American School of Information Theory*, Purdue University, West Lafayette, IN. June 2013

E. C. Song, E. Soljanin, K. C. Guan and P. J. Winzer, “Imperfect Information Theoretic Secrecy for Multimode Fiber,” *DIMACS Workshop on Information-Theoretic Network Security*, Rutgers, NJ. November 2012

COMPUTER SKILLS

- Languages: C/C++, Java, Spring, Python, MATLAB, R, HTML
- Applications: AWS tools, L^AT_EX, CSS, COMSOL, Mathematica, etc.
- OS: Linux/Unix, MacOS X, Windows

SELECTED COURSEWORK

- Information Theory
- Digital Communications and Networks
- Optimization of Communication Networks
- Image Processing
- Theory of Detection and Estimation
- Machine Learning
- Probability Theory
- Data Structures and Algorithms
- Computer Systems

HONORS AND AWARDS

Rising Stars in EECS, Workshop at MIT	2015
Wu Prize for Excellence, Princeton University	2014
Eta Kappa Nu, Electrical and Computer Engineering Honor Society	Since 2008
Tau Beta Pi, Engineering Honor Society	Since 2008
Graduated with Honors, Carnegie Mellon University	May 2010
Dean’s List, Carnegie Mellon University	2007-2009