Lei Zhang

CONTACT INFORMATION

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Canada

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HIGHLIGHTS

- Theoretical research in channel coding, information theory, statistical inference and detection
- Expert in modern (LDPC, Turbo, RA, LT) and classical (RS, BCH, convolutional, concatenated) coding theory and their practical implementation
- Strong mathematical background in probability and stochastic processes, graphical models, inference algorithms and machine learning techniques
- Proficient in Matlab, R for modelling and algorithm development
- Experienced in C/C++, Java, Bash, Python for research and industrial projects
- Familiar with Unix, Windows, LaTeX, Microsoft Office
- Practical experience with laboratory equipment such as signal and noise generators, channel simulators, spectrum analyzer, logic analyzer, etc.

EDUCATION

University of Toronto, Toronto, ON **Sep. 2011 - Aug. 2015 (expected)**
Ph.D., Communications Group, Department of Electrical and Computer Engineering

Advisor: Prof. Frank R. Kschischang CGPA: 3.94/4.0
Topic: Efficiently decodable near-capacity codes for long-haul fiber-optic transmission

- Design and analysis of spatially-coupled efficiently decodable channel codes for optical communication systems.
- Theoretical analysis of stochastic decoding over large graph ensembles, leading to novel code structures and efficient decoding algorithms with best-in-class performance.

Relevant courses: Probability and random processes, graph theory, single and multi-user information theory, convex optimization, error-control coding, digital communications, statistical methods for machine learning and data mining

University of Toronto, Toronto, ON **Sep. 2009 - Jun. 2011**
M.A.Sc., Communications Group, Department of Electrical and Computer Engineering

Advisor: Prof. Frank R. Kschischang CGPA: 3.94/4.0
Thesis: Multi-edge low-density parity-check (LDPC) coded modulation

- Developed multi-dimensional EXIT technique for optimizing code ensembles with respect to constellation mapping and modulation.
- Implemented belief-propagation and min-sum decoding simulation in C with higher-order modulation and demapping.

University of Waterloo, Waterloo, ON **Sep. 2004 - Jun. 2009**
B.A.Sc. Honours, Co-op, Math Option, Department of Electrical and Computer Engineering

CGPA: 4.0/4.0

WORK EXPERIENCE

QKD Corp., Toronto, ON **Sep. 2013 - present**
Research Scientist

- Start-up focusing on commercial continuous-variable quantum key distribution (CV-QKD)
- Research and development of error-correction strategies for CV-QKD

Cortina Systems Corp., Ottawa, ON **May 2013 - Aug. 2013**
Systems Design Engineering Intern

- Designed an efficient soft-input erasure declaration algorithm for Hamming codes
- Optimized concatenated coding system for high-speed optical interconnects

University of Toronto, Toronto, ON **Jan. 2010 - present**
Teaching Assistant

- Teaching assistant for engineering undergraduate courses, encompassing tutorial, laboratory, and occasional teaching duties. Courses include: Digital Communications (ECE416), Probability and Random Processes (ECE302), Communication Systems (ECE316), Signals and Systems (ECE216)

Broadcom Corp., Irvine, California USA **Jan. 2007 - Sep. 2009**
Broadband Communications Intern

- Designed and implemented a loop-free carrier offset recovery algorithm on an 8-bit microprocessor
- Developed a variable, fractional sample-rate converter based on polynomial interpolation
- Optimized QAM receiver sampling rate to reduce adjacent channel interference
- Studied the use of discrete Fourier transform for carrier frequency offset and interference detection
- Designed digital FIR pre-emphasis filter for audio RF modulator

Publications

Zhang L. M., and Kschischang F. R. , "Staircase Codes With 6% to 33% Overhead," Journal of Lightwave Technology. vol. 32, no. 10, pp. 1999-2002, May 2014.

Zhang L. M., and Kschischang F. R., "Multi-edge-type Low-density Parity-check Codes for Bandwidth-efficient Modulation," IEEE Transactions on Communications, vol. 61, no. 1, pp. 43-52, Jan. 2013.

Honours and Awards

Ontario Graduate Scholarship (Provincial)	2011, 2012
NSERC CGS-M (National)	2009
CISCO Systems Inc. 4th Year Scholarship (Institutional)	2009
Microsoft Corp. Merit Scholarship (Institutional)	2007

Activities

ECE graduate student symposium organizing committee **Sep. 2012 - Jun. 2013**
Sponsorship Liaison

- Help to organize graduate student symposium attended by over 200 graduate student, faculty, and industry participants.
- Responsible for contacting external industry sponsors for event financial support, participating sponsors include Altera, Intel, etc.

Hart House Chamber Strings **Sep. 2012 - Jun. 2013**
2nd Violin

- Participated in weekly rehearsals and delivered 3 performances at Hart House during school year.