

David Varodayan

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Education

Ph.D. Candidate, Electrical Engineering Stanford University Stanford, California
2005–present

M.S. Electrical Engineering Stanford University Stanford, California
Stanford University **2003–2005**
Graduate GPA 4.00/4.

B.A.Sc. Engineering Science University of Toronto Toronto, Canada
University of Toronto **1999–2003**
Undergraduate GPA 3.92/4. Graduated with Honor Standing.

Awards

Best Student Paper Award (co-author), *EURASIP European Signal Processing Conference* (2007)
Best Student Paper Award (first author), *IEEE Multimedia Signal Processing Workshop* (2006)
Division of Engineering Science Academic Excellence Award, *University of Toronto* (2003)
Honorable Mention (ranked 53rd in North America), *Putnam Mathematical Competition* (2000)
Australian Students Prize, *Government of Australia* (1998)
Premier's Trophy for Excellence, *Government of New South Wales* (1998)
Bronze Medal, *Asian-Pacific Mathematical Olympiad* (1997)

Scholarships

School of Engineering Fellowship, *Stanford University* (2003)
First Garnet W. McKee - Lachlan Gilchrist Geo-Physics Scholarship, *University of Toronto* (2001)
University of Toronto Scholar, *University of Toronto* (2000)
Faculty of Applied Science and Engineering Admission Scholarship, *University of Toronto* (1999)
New South Admission Scholarship, *University of New South Wales* (1999)
Full Academic Grainger Scholarship, *Sydney Grammar School* (1993–1998)

Research and Work Experience

Research Assistant (Ph.D.) Stanford University Stanford, California
Stanford University **2004–present**
Advisor: Prof. Bernd Girod. Invented construction of rate-adaptive low-density parity-check codes, and proposed unsupervised machine learning of side information parameters, both to improve performance of distributed (Slepian-Wolf) compression algorithms. Applied these methods to practical problems: low-complexity video compression, distributed stereo image compression, media authentication and tampering localization, reduced-reference image quality assessment. Published 2 journal papers and 16 conference papers.

Research Engineer Intern DoCoMo Communications Laboratories USA Palo Alto, California
DoCoMo Communications Laboratories USA **Summer 2007**
Supervisor: Dr. Christine Pépin. Invented method for traitor tracing in multimedia fingerprinting systems based on sparse signal approximation (l_1 -norm minimization) algorithms. Demonstrated superior robustness against traitor collusion at comparable computational cost with respect to the state-of-the-art. Filed provisional patent application and published *IEEE* conference paper.

Research Assistant University of Toronto Toronto, Canada
University of Toronto **Summer 2003, Summer 2004**
Advisor: Prof. Wei Yu. Developed, analyzed and simulated novel convolutional and trellis pre-coding schemes for channels with transmitter side information. Published *IEEE* journal paper.

Research and Work Experience (continued)

Research Assistant (B.A.Sc. thesis)

University of Toronto

Toronto, Canada

Fall 2002

Advisor: Prof. Frank Kschischang. Derived criteria for the selection of sequences of Reed-Muller codes to be concatenated by the Elias product code construction.

Program Manager Intern

Microsoft Corporation

Redmond, Washington

Summer 2002

Designed APIs and wrote specifications for SQL Server's XML data access interfaces. Conducted review meetings with developers and testers.

Research Assistant

University of Toronto

Toronto, Canada

Summer 2001

Advisor: Prof. Stephen Davies. Implemented and modified convolutional coding schemes and sequential decoders to enable automatic error correction of convolved DNA sequencing results.

Research Assistant

University of Toronto

Toronto, Canada

Summer 2000

Advisor: Prof. Jianwen Zhu. Tested and debugged software for behavioral synthesis of C into register transfer level VHDL.

Teaching

Teaching Assistant (graduate level)

Stanford University

Stanford, California

2006–2008

Four quarters of graduate courses Image & Video Compression and Image Communication I & II. Taught weekly review sections of up to 24 students and created homework questions. Proposed 9 class projects and mentored groups of 1 to 3 students, including winner of Best Project Award of Image Communication II.

Teaching Assistant (undergraduate level)

University of Toronto

Toronto, Canada

2000–2003

Five semesters of freshman courses in Calculus, Linear Algebra and Data Structures & Algorithms. Taught weekly review sections of up to 30 students.

Journal Papers

1. **D. Varodayan**, D. Chen, M. Flierl and B. Girod, "Wyner-Ziv coding of video with unsupervised motion vector learning," *EURASIP Signal Processing: Image Communication Journal, Special Issue on Distributed Video Coding*, vol. 23, no. 5, pp. 369-378, June 2008. Invited paper.
2. **D. Varodayan**, A. Aaron and B. Girod, "Rate-adaptive codes for distributed source coding," *EURASIP Signal Processing Journal, Special Section on Distributed Source Coding*, vol. 86, no. 11, pp. 3123-3130, November 2006.
3. W. Yu, **D. Varodayan** and J. Cioffi, "Trellis and convolutional precoding for transmitter-based interference pre-subtraction," *IEEE Transactions on Communications*, vol. 53, no. 7, pp. 1220-1230, July 2005.

Conference Papers

4. D. Chen, **D. Varodayan**, M. Flierl and B. Girod, "Wyner-Ziv coding of multiview images with unsupervised learning of two disparities," *Proc. IEEE International Conference on Multimedia and Expo, ICME 2008*, Hannover, Germany, June 2008.
5. Y.-C. Lin, **D. Varodayan**, T. Fink, E. Bellers and B. Girod, "Authenticating contrast and brightness adjusted images using distributed source coding and expectation maximization," *Proc. IEEE International Conference on Multimedia and Expo, ICME 2008*, Hannover, Germany, June 2008.

Conference Papers (continued)

6. K. Chono, Y.-C. Lin, **D. Varodayan**, Y. Miyamoto and B. Girod, "Reduced-reference image quality estimation using distributed source coding," *Proc. IEEE International Conference on Multimedia and Expo, ICME 2008*, Hannover, Germany, June 2008.
7. **D. Varodayan** and C. Pépin, "Collusion-aware traitor tracing in multimedia fingerprinting using sparse signal approximation," *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2008*, Las Vegas, Nevada, April 2008.
8. **D. Varodayan**, Y.-C. Lin and B. Girod, "Audio authentication based on distributed source coding," *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2008*, Las Vegas, Nevada, April 2008.
9. D. Chen, **D. Varodayan**, M. Flierl and B. Girod, "Distributed stereo image coding with improved disparity and noise estimation," *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2008*, Las Vegas, Nevada, April 2008.
10. A. Mavlankar, **D. Varodayan** and B. Girod, "Region-of-interest prediction for interactively streaming regions of high resolution video," *Proc. IEEE International Packet Video Workshop, PV 2007*, Lausanne, Switzerland, November 2007.
11. **D. Varodayan**, Y.-C. Lin, A. Mavlankar, M. Flierl and B. Girod, "Wyner-Ziv coding of stereo images with unsupervised learning of disparity," *Proc. Picture Coding Symposium, PCS 2007*, Lisbon, Portugal, November 2007. **Best Paper Finalist.**
12. Y.-C. Lin, **D. Varodayan** and B. Girod, "Spatial models for localization of image tampering using distributed source codes," *Proc. Picture Coding Symposium, PCS 2007*, Lisbon, Portugal, November 2007.
13. Y.-C. Lin, **D. Varodayan** and B. Girod, "Image authentication and tampering localization using distributed source coding," *Proc. IEEE International Workshop on Multimedia Signal Processing, MMSP 2007*, Crete, Greece, October 2007.
14. Y.-C. Lin, **D. Varodayan** and B. Girod, "Image authentication based on distributed source coding," *Proc. IEEE International Conference on Image Processing, ICIP 2007*, San Antonio, Texas, September 2007. Invited Paper.
15. A. Mavlankar, P. Baccichet, **D. Varodayan** and B. Girod, "Optimal slice size for streaming regions of high resolution video with virtual pan/tilt/zoom functionality," *Proc. European Signal Processing Conference, EUSIPCO 2007*, Poznan, Poland, September 2007. **Best Student Paper Award.**
16. **D. Varodayan**, A. Mavlankar, M. Flierl and B. Girod, "Distributed grayscale stereo image coding with unsupervised learning of disparity," *Proc. IEEE Data Compression Conference, DCC 2007*, Snowbird, Utah, March 2007.
17. **D. Varodayan**, A. Mavlankar, M. Flierl and B. Girod, "Distributed coding of random dot stereograms with unsupervised learning of disparity," *Proc. IEEE International Workshop on Multimedia Signal Processing, MMSP 2006*, Victoria, Canada, October 2006. **Best Student Paper Award.**
18. **D. Varodayan**, A. Aaron and B. Girod, "Exploiting spatial correlation in pixel-domain distributed image compression," *Proc. Picture Coding Symposium, PCS 2006*, Beijing, China, April 2006.
19. A. Aaron, **D. Varodayan** and B. Girod, "Wyner-Ziv residual coding of video," *Proc. Picture Coding Symposium, PCS 2006*, Beijing, China, April 2006.
20. **D. Varodayan**, A. Aaron and B. Girod, "Rate-adaptive distributed source coding using low-density parity-check codes," *Proc. Asilomar Conference on Signals, Systems, and Computers 2005*, Pacific Grove, CA, November 2005.

Invited Talks

1. “Learning motion in distributed video coding,” *DISCOVER Workshop on Recent Advances in Distributed Video Coding*, Lisbon, Portugal, November 2007.
2. “Rate-adaptive distributed source coding using low-density parity-check codes,” *Max Planck Center for Visual Computing and Communication Workshop*, Saarbrücken, Germany, November 2005.

Professional Service

Journal Reviewer

IEEE Transactions on Image Processing

IEEE Transactions on Communications

IEEE Transactions on Signal Processing

IEEE Transactions on Circuits and Systems for Video Technology

IEEE Transactions on Wireless Communications

IEEE Communications Letters

IEEE Signal Processing Letters

EURASIP Journal on Image and Video Processing

EURASIP Journal on Wireless Communications and Networking

Journal of Computer Science and Technology

Reviewing Committee, *Picture Coding Symposium*, Lisbon, Portugal, November 2007