

# Xiugang Wu

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## Research Interests

- Information Theory, Wireless Communications and Networks, Data Center Networks
- Machine Learning, Statistical Inference

## Education

- University of Waterloo**, Waterloo, Ontario, Canada 06/2014
- *Doctor of Philosophy*, Electrical & Computer Engineering
  - Thesis: *Coding Schemes for Multiple-Relay Channels*
- University of Waterloo**, Waterloo, Ontario, Canada 06/2009
- *Master of Applied Science*, Electrical & Computer Engineering
- Tongji University**, Shanghai, China 06/2007
- *Bachelor of Engineering (Rank: 1/123)*, Electronic & Information Engineering

## Employment

- University of Delaware**, Newark, DE
- *Assistant Professor*, Department of Electrical & Computer Engineering 09/2018–Present
  - *Assistant Professor*, Department of Computer & Information Systems 09/2018–Present
  - *Affiliated Faculty*, Data Science Institute 09/2018–Present
- Stanford University**, Stanford, CA
- *Postdoctoral Fellow*, Department of Electrical Engineering 01/2015–05/2018
- University of Waterloo**, Waterloo, Ontario, Canada
- *Research Assistant*, Department of Electrical & Computer Engineering 09/2007–12/2014

## Honors and Awards

- NSF Center for Science of Information (CSoI) Postdoctoral Fellowship 2017
- University of Waterloo Graduate Scholarship, University of Waterloo 2010–2013
- Faculty of Engineering Graduate Scholarship, University of Waterloo 2008, 2012
- Best Speaker Award, ECE Graduate Student Research Talks, University of Waterloo 2011
- Distinguished Honor Graduate of Shanghai City, Shanghai, China 2007

## Invited Talks

- “Capacity upper bounds for the relay channel: geometric and functional approaches”
  - Conference on Information Sciences and Systems (CISS), JHU, Mar. 2019
- “Minimax learning for remote prediction”
  - Banff Workshop on “Intersection of Information Theory and Signal Processing: New Signal Models, their Information Content and Acquisition Complexity”, Oct. 2018
- “Fundamental limits in information networks: Communication, inference and learning”
  - Dept. of ECE, Cornell University, April 2018
  - Dept. of ECE, University of Toronto, August 2018
  - Dept. of ECE, Dept. of CIS, University of Delaware, Sept. 2018
  - Dept. of CIS, Temple University, Dec. 2018
- “Information theory, geometry, and Cover’s open problem”
  - Information Theory Forum, Dept. of EE, Stanford University, Feb. 2017
- “Cover’s open problem: “The capacity of the relay channel””
  - Dept. of ECE, McMaster University, Oct. 2016
- “Improving on the cut-set bound via geometric analysis of typical sets”
  - Dept. of ECE, McMaster University, Oct. 2015
  - Dept. of ECE, University of Toronto, Oct. 2015
  - Information Theory Forum, Dept. of EE, Stanford University, Jan. 2016
  - BLISS Seminar, Dept. of EECS, UC Berkeley, Feb. 2016
- “Proving converses for multi-user problems via measure concentration”
  - Information Theory and Applications Workshop (ITA), UCSD, Feb. 2016
- “Recent progress on relay channels: coding schemes and upper bounds”
  - Dept. of ECE, University of Toronto, Oct. 2014

## Publications

### Journals

- [J1] C. T. Li, **X. Wu**, A. Ozgur, A. El Gamal, “Minimax learning for remote prediction,” submitted to *IEEE Trans. Inform. Theory*, Nov 2018.
- [J2] **X. Wu**, L. Barnes, A. Ozgur, ““The capacity of the relay channel”: Solution to Cover’s problem in the Gaussian Case,” *IEEE Trans. Inform. Theory*, vol. 65, pp. 255–275, January 2019.
- [J3] **X. Wu** and A. Ozgur, “Cut-set bound is loose for Gaussian relay networks,” *IEEE Trans. Inform. Theory*, vol. 64, pp. 1023–1037, February 2018.
- [J4] **X. Wu**, A. Ozgur, and L.-L. Xie, “Improving on the cut-set bound via geometric analysis of typical sets,” *IEEE Transactions on Information Theory*, vol. 63, pp. 2254–2277, April 2017.
- [J5] **X. Wu**, S. Zhang and A. Ozgur, “STAC: Simultaneous Transmitting and Air Computing in wireless data center networks,” *IEEE Journal on Selected Areas in Communications*, vol. 34, pp. 4024–4034, Dec. 2016.
- [J6] **X. Wu** and L.-L. Xie, “A unified relay framework with both D-F and C-F relay nodes,” *IEEE Transactions on Information Theory*, vol. 60, no.1, pp. 586–604, January 2014.

- [J7] **X. Wu** and L.-L. Xie, “On the optimal compressions in the compress-and-forward relay schemes,” *IEEE Transactions on Information Theory*, vol. 59, no. 5, pp. 2613-2628, May 2013.

## Conferences

- [C1] C. T. Li, **X. Wu**, A. Ozgur, A. El Gamal, “Minimax learning for remote prediction,” *2018 International Symposium on Information Theory*.
- [C2] L. Barnes, **X. Wu**, A. Ozgur, “A solution to Cover’s problem for the binary symmetric relay channel: Geometry of sets on the Hamming sphere,” in *Proc. of 55th Annual Allerton Conference on Communication, Control, and Computing*, Allerton Retreat Center, Monticello, Illinois, 2017.
- [C3] **X. Wu**, L. Barnes, A. Ozgur, “The geometry of the relay channel,” in *Proc. of IEEE International Symposium on Information Theory*, Aachen, Germany, June 2017.
- [C4] **X. Wu**, L. Barnes, A. Ozgur, “Cover’s open problem: “The capacity of the relay channel”,” in *Proc. of 54th Annual Allerton Conference on Communication, Control, and Computing*, Allerton Retreat Center, Monticello, Illinois, 2016. (Invited)
- [C5] **X. Wu**, A. Ozgur, “Improving on the cut-set bound for general primitive relay channels,” in *Proc. of IEEE International Symposium on Information Theory*, Barcelona, Spain, Jul. 2016.
- [C6] **X. Wu**, A. Ozgur, “Improving on the cut-set bound via geometric analysis of typical sets,” in *Proc. of 2016 International Zurich Seminar on Communications*, Zurich, Mar. 2016.
- [C7] **X. Wu**, A. Ozgur, “Cut-set bound is loose for Gaussian relay networks,” in *Proc. of 53rd Annual Allerton Conference on Communication, Control, and Computing*, Allerton Retreat Center, Monticello, Illinois, Sept. 29–Oct. 1, 2015.
- [C8] **X. Wu**, L.-L. Xie, A. Ozgur, “Upper bounds on the capacity of symmetric primitive relay channels,” in *Proc. of IEEE International Symposium on Information Theory 2015*, Hong Kong, June 14–19, 2015.
- [C9] S. Zhang, **X. Wu**, A. Ozgur, “STAC: Simultaneous Transmitting and Air Computing in wireless data center networks,” in *Proc. of IEEE/CIC International Conference on Communications in China*, Shenzhen, China, Nov. 2–4, 2015.
- [C10] Z. Ma, **X. Wu**, H. Xu, “Understanding the degree distribution pattern of protein-protein interaction networks,” in *Proc. of IEEE International Symposium on Bioelectronics and Bioinformatics*, Beijing, China, Oct. 14–17, 2015.
- [C11] **X. Wu** and L.-L. Xie, “A unified relay framework with both D-F and C-F relay nodes,” in *Proc. of the 13th Canadian Workshop on Information Theory*, Toronto, Canada, June 18–21, 2013.
- [C12] **X. Wu** and L.-L. Xie, “Codebook information does not reduce output entropy when rate is above capacity,” in *Proc. of 48th Annual Allerton Conference on Communication, Control, and Computing*, Allerton Retreat Center, Monticello, Illinois, Sept. 29–Oct. 1, 2010. (Invited)
- [C13] **X. Wu** and L.-L. Xie, “On the optimality of successive decoding in compress-and-forward relay schemes,” in *Proc. of 48th Annual Allerton Conference on Communication, Control, and Computing*, Allerton Retreat Center, Monticello, Illinois, Sept. 29–Oct. 1, 2010. (Invited)
- [C14] **X. Wu** and L.-L. Xie, “An optimality-robustness tradeoff in the compress-and-forward relay scheme,” in *Proc. of IEEE 72nd Vehicular Technology Conference*, Ottawa, Sept. 2010.
- [C15] **X. Wu** and L.-L. Xie, “AEP of output when rate is above capacity: the Gaussian case,” in *Proc. of IEEE International Symposium on Information Theory 2010*, Austin, Texas, U.S.A., June 13–18, 2010.
- [C16] **X. Wu** and L.-L. Xie, “AEP of output when rate is above capacity,” in *Proc. of the 11th Canadian Workshop on Information Theory*, Ottawa, Canada, May 13–15, 2009.

## Teaching Experience

*Instructor*, University of Delaware

- ELEG/CISC 867 - Advanced Machine Learning, Spring 2019

*Assistant Instructor*, Stanford University

- EE 279 - Introduction to Digital Communication, Winter 2016
- EE 379 - Digital Communication, Spring 2016

## Professional Activities

- **Invited Conference Session Organizer**
  - Conference on Information Sciences and Systems (CISS), 2019
- **Conference Session Chair**
  - Conference on Information Sciences and Systems (CISS), 2019
  - Information Theory and Application Workshop (ITA), 2017
  - IEEE Vehicular Technology Conference (VTC), 2010
- **Reviewer (Journals)**
  - IEEE Transactions on Information Theory
  - IEEE/ACM Transactions on Networking
  - IEEE Transactions on Communications
  - IEEE Transactions on Wireless Communications
  - IEEE Transactions on Vehicular Technology
  - IEEE Communications Letters
  - IET Communications
  - Journal of Systems Science and Complexity (Springer)
  - Ad Hoc Networks (Elsevier)
- **Reviewer (Conferences)**
  - IEEE International Symposium on Information Theory (ISIT)
  - IEEE Information Theory Workshop (ITW)
  - IEEE Global Telecommunications Conference (GLOBECOM)
  - IEEE Wireless Communications and Networking Conference (WCNC)