Shang Li

✉ shang@ee.columbia.edu • ✆ (917)-769-6626
🖥 www.columbia.edu/~sl3479

Education

Columbia University   **New York**
Ph.D., Electrical Engineering   *2012–2016 (expected)*
Advisor: Prof. Xiaodong Wang

Hong Kong University of Science and Technology   **Hong Kong**
M.Phil., Electronic and Computer Engineering   *2010–2012*
Advisor: Prof. Matthew McKay

Peking University   **Beijing**
B. S., Electrical Engineering and Computer Science   *2006–2010*

Research

Interests: Sequential decision-making, stochastic control, dynamic optimization, change-point detection, time series analysis, statistical signal processing, and statistical machine learning.

PhD thesis: Distributed sequential statistical inference, with applications in anomaly detection and cyber security in sensor networks.

Projects & Publications

Change-Point Detection in the Cyber-Networks (4 journal papers and 2 conference papers)

[J1] **Shang Li** and Xiaodong Wang, "Cooperative Change Detection for Voltage Quality Monitoring in Smart Grids", *IEEE Trans. on Information Forensics and Security, vol. 11, no. 1, pp. 86-99, Jan. 2016.*

[J2] **Shang Li**, Yasin Yılmaz, and Xiaodong Wang, "Quickest Detection of False Data Injection Attack in Wide-Area Smart Grids", *IEEE Trans. on Smart Grid, vol. 6, no. 6, pp. 2725-2735, Nov. 2015.*

[J3] **Shang Li** and Xiaodong Wang, "Quickest Attack Detection in Multi-Agent Reputation Systems", *IEEE Journal of Selected Topics in Signal Processing*, vol. 8, no. 4, pp. 653-666, Aug. 2014.

[J4] Leian Chen, **Shang Li**, and Xiaodong Wang, "Multi-Meter Quickest Fault Detection in Photovoltaic Systems", submitted to *IEEE Transactions on Smart Grid*.

[C1] **Shang Li** and Xiaodong Wang, "Sequential Cyber-Attack Detection in the Large-Scale Smart Grid System", *IEEE Int. Conf. on Smart Grid Communications*, 2-5 Nov., Miami, FL, 2015.

[C2] **Shang Li** and Xiaodong Wang, "Monitoring Disturbances in Smart Grids Using Distributed Sequential Change Detection", *IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing*, 15-18 Dec., St. Martin, 2013. — **Finalist of the Best Student Paper.**

Sequential Hypothesis Testing with Sensor Fusion and Constrained Sensing Control (2 journal papers and 2 conference papers)

[J5] **Shang Li**, Xiaoou Li, Xiaodong Wang, and Jingchen Liu, "Decentralized Sequential Composite Hypothesis Test Based on One-Bit Communication", submitted to *IEEE Trans. on Information Theory*.

[J6] **Shang Li**, Xiaoou Li, Xiaodong Wang, and Jingchen Liu, "Sequential Hypothesis Testing with Usage-Constrained Online Sensor Selection", submitted to *IEEE Transactions on Information Theory*.

[J7] **Shang Li** and Xiaodong Wang, "Order-2 Asymptotic Optimality of the Fully Distributed Sequential Hypothesis Test", submitted to *IEEE Transactions on Information Theory*.

[C3] **Shang Li**, Xiaoou Li, Xiaodong Wang, and Jingchen Liu, "Multi-Sensor Generalized Sequential Probability Ratio Test Using Level-Triggered Sampling", *IEEE Global Conference on Signal & Information Processing*, 15-18 Dec., Orlando, FL, 2015.

[C4] **Shang Li**, Xiaoou Li, Xiaodong Wang, and Jingchen Liu, "Optimal Sequential Test with Finite Horizon and Constrained Sensor Selection", *IEEE Int. Sym. on Inf. Theory (ISIT)*, 10-15 Jul., Barcelona, 2016.

Detection and Estimation Theory & Nonlinear Bayesian Filtering (3 journal papers and 1 conference paper)

[J8] **Shang Li** and Xiaodong Wang, "Optimal Joint Detection and Estimation Based on Decision-Dependent Bayesian Cost", *IEEE Transactions on Signal Processing*, vol. 64, no. 10, pp. 2573-2586, May 2016.

[J9] Yasin Yılmaz, **Shang Li**, and Xiaodong Wang, "Sequential Joint Detection and Estimation: Optimum Tests and Applications", to appear, *IEEE Transactions on Signal Processing*.

[J10] Ziyu Guo, **Shang Li**, Xiaodong Wang, and Wei Heng, "Distributed Point-Based Gaussian Approximation Filtering for Forecasting-Aided State Estimation in Power Systems", *IEEE Transactions on Power Systems*, vol. 31, no. 4, pp. 2597-2608, Jul. 2016.

[C5] **Shang Li**, Yasin Yılmaz, and Xiaodong Wang, "Joint Composite Detection and Bayesian Estimation: A Neyman-Pearson Approach", *IEEE Global Conference on Signal & Information Processing*, 15-18 Dec., Orlando, FL, 2015.

Information Theory in Multi-Antenna Wireless Communication Systems: (1 journal paper and 2 conference papers)

[J11] **Shang Li**, Matthew McKay, and Yang Chen, "On the Distribution of MIMO Mutual Information: An In-Depth Painlevé-Based Characterization", *IEEE Transactions on Information Theory*, vol. 59, no. 9, pp. 5271-5296, Sep. 2013.

[C6] **Shang Li**, Matthew McKay, and Yang Chen, "Characterizing the mutual information distribution of MIMO systems: Beyond the Gaussian approximation", in proc. of the 46th Annual Asilomar Conference on Signals, Systems and Computers.

[C7] **Shang Li**, Yang Chen, and Matthew McKay, "Mutual information distribution of interference-limited MIMO: A joint Coulomb Fluid and Painlevé based approach", in proc. of the 45th Annual Asilomar Conference. — **Finalist of the Best Student Paper**. See here.

Awards & Recognitions

2013: Columbia Wei Family Foundation Special Scholarship

2013: Finalist of the Best Student Paper Award at CAMSAP

2012: Ranked 3rd in Doctoral Qualifying Exam

2011: Finalist of the Best Student Paper Award at Asilomar Conference

2011: HKUST Research Travel Grant

2010: HKUST Graduate Scholarship

2009: Peking University Chun-Tsung Undergraduate Research Grant

2009: Peking University SK Scholarship

Experience

Teaching

Columbia University   **New York**
Substitute Lecturer & Teaching Assistant   *2012–2015*
Detection and Estimation Theory, MIMO Wireless Communication, Information Theory

Hong Kong University of Science and Technology   **Hong Kong**
Teaching Assistant   *2010–2012*
Digital Circuits and Systems, Multimedia and its Application

Conference Service...

The Fifth International Workshop in Sequential Methodologies   **New York**
Student Assistant   *Jun. 2015*

Innovation and the Value of Privacy   **New York**
Student Assistant   *Feb. 2016*

Peer Review...

Journals: Statistica Sinica, IEEE Trans. Information Theory, IEEE Trans. Signal Processing, IEEE Access
Conferences: ICASSP'2012, ICC'2012&2014, ITW'2013, ISIT'2014, MLSP'2015, BMSB'2016

Selected Courseworks

Topics in Advanced Statistics (STAT G8325)
Advanced Machine Learning (COMS W4772)
Statistical Machine Learning (STAT W4400)
Stochastic Modelling I (IEOR E6711)
Stochastic Process (STAT W4635)
Time Series Analysis (STAT W4437)
Detection and Estimation Theory (ELEN E6873)
Game Theory (ECON W4415)
Sparse Representation and High-Dimensional Geometry (ELEN E6886)
Advanced Probability Theory I (MATH 5411, HKUST)
Convex Optimization (ELEC 5479, HKUST)

Computer Skills

Matlab, Python, C/C++, Maple, Mathematica, html, LaTeX

References

○ **Prof. Xiaodong Wang** (Professor, Department of Electrical Engineering, Columbia University)
  Email: wangx@ee.columbia.edu

○ **Prof. Jingchen Liu** (Associate Professor, Department of Statistics, Columbia University)
  Email: jcliu@stat.columbia.edu

○ **Prof. Matthew McKay** (Associate Professor, Department of Electronic and Computer Engineering, Hong Kong University of Science and Technology)
  Email: eemckay@ust.hk