Yeow-Khiang Chia

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Research Interests	Information Theory, Machine Learning, Statistical Signal Processing, Mathematical Optimization, Data Analytics

Education

Stanford University
Ph.D. in Electrical Engineering, January 2012
Thesis topic: Multi-terminal Secrecy and Source Coding
GPA: 4.0/4.0
Advisers: Profs. Abbas El Gamal and Tsachy Weissman
Thesis Committee: Profs. Thomas Cover and Ada Poon

Stanford University
M.S. in Electrical Engineering, January 2012, GPA: 4.0/4.0

Imperial College, London
M.Eng. (First Class Honours) in Electrical Engineering June 2001
Thesis topic: Lyapunov methods for adaptive gain control

Professional Experience

Research Staff Member, **IBM Research Singapore**. June 2015 - Current
- Principal investigator for project between Maritime and Port Authority of Singapore (MPA) and IBM in developing a sense-making and predictive analytics system for MPA. Project involves using data analytics and machine learning to enhance MPA's operations in the Maritime domain
- Research on data analytics and signal processing for road networks. Co-developed an adaptive sampling algorithm for efficient collection, and accurate estimation, of traffic information in road networks. Patent filed in the United States

Scientist II, **Data Analytics Department, Institute for Infocomm Research, Singapore**
April 2014 - May 2015. Working on the following projects
- Financial and Audit Analytics for DBS Singapore. Project is part of DBS-I2R Joint laboratory.
- Financial Analytics and Algorithms for commodity trading. Project is a joint project with Wealth Sciences Pte Ltd and Straits Financial LLC.
- Signal processing algorithms for Book Sequencing from RFID time series readings. Joint project with National Library Board of Singapore.

Scientist I, **Advanced Communication Department, Institute for Infocomm Research, Singapore**. Feb 2012 - April 2014.
Worked on the following projects: i) Energy resource optimization in cellular networks with renewable energy resources; ii) Fundamental Information Theoretic limits of network communication systems.

Research Assistant, **El Gamal Research Group, Stanford University**
September 2006 - December 2011. PhD thesis research on Network Information Theory

Visiting Research student, Prof. Zhang Lin's group, **Tsinghua University, China**
March 2010 - May 2010. Worked on Throughout and Delay scaling in wireless mobile networks

Summer Intern, **Ji Research Group, Stanford University**
June 2007- September 2007. Worked with Profs. Hanlee Ji and Tsachy Weissman on signal processing for shotgun DNA sequencing

Research Attachment at **Institute for Infocomm Research, Singapore**
August 2005 - August 2006. Worked with on signal processing for localization

Strategic Planning Executive, **Ministry of Home Affairs, Singapore**
April 2003 - July 2005. Responsible for Manpower, Budget and planning policies.

Summer intern at **Center for Imaging, Remote Sensing and Processing (CRISP)**
July 2000 - September 2000. Worked on image processing algorithms for satellite images

Awards and Honors	Institute of Engineers Singapore (IES) Prestigious Engineering Achievement Award 2015 for project "The Future of Audit: Predictive Analytics on Irregularities and Risks in Bank Branches". Joint project between Institute for Infocomm Research and DBS Bank
	IEEE Transactions on Communications Exemplary Reviewer 2016
	Stanford Graduate Fellowship, 2009 - 2011
	Singapore Agency for Science, Technology and Research (A*STAR) National Science Scholarship, 2006-2011
	IEE prize for distinction (best all round student) in the four years degree course at Department of Electrical and Electronics Engineering, Imperial College. June 2001
	Singapore Public Service Commission scholarship for undergraduate studies at Imperial College, 1997-2001
Skills	Please see Appendix A for a full list of Masters and PhD level courses taken at Stanford University, as well as online courses taken with Coursera, edX and Udacity. Courses cover the following areas

- Information Theory and Probability Theory
- Machine Learning and Signal Processing, including Deep Learning
- Mathematical Optimization and Discrete Algorithms
- Control Theory, Linear Dynamical Systems and Stochastic Systems
- Game Theory and Economics

Programming skills and experience: Proficient in **Python**, **R**, **Java**, **Matlab**, **C++**

Publications and Patents	A full list of patents and publications is given in Appendix B, or the following website: http://ykchia.github.io/publications.html
Teaching Experience	Teaching assistant for courses on Signal Processing (2011, Instructor: Prof. Tsachy Weissman) and Information Theory (2010, Instructor: Prof. Abbas El Gamal)
Professional Activities	Reviewer since 2009 for the IEEE journals and conferences: Information Theory, Communications, Wireless Communications, Information Security and Forensics
References	Available on request. Please see Appendix C for a list of potential referees

Appendix A: Coursework

Online courses taken from Coursera, edX, Udacity and Stanford Online Learning

Certificates of accomplishment are available all of the courses listed except for Deep Learning course by Udacity, which does not provide a certificate on its own. Evidence of coursework is available.

- Big Data Analysis with Apache Spark, September 2016. Course provider: edX
- Introduction to Apache Spark, September 2016. Course provider: edX
- Deep Learning, July 2016. Course provider: Udacity
- Mining Massive Datasets. Course provider: Coursera
- Machine Learning, May 2014. Course provider: Coursera
- Introduction to Statistical Learning with R, April 2014. Course Provider: Stanford Online

Masters and PhD level courses at Stanford University

A short description of the course content is given for courses with somewhat vague titles. Only Masters and PhD level courses taken at Stanford University are included in this list.

Information Theory and Communications

- EE376A: Information Theory Part A
- EE376B Information Theory Part B
- EE478: Network Information Theory
- EE477: Universal Schemes in Information Theory (audit): Schemes for compression, prediction and denoising of sources with unknown distributions. Rate distortion theory for ergodic sources.
- EE387: Algebraic Error Control Codes
- EE388: Modern Coding Theory - Codes on graphs such as LDPC codes
- EE379A: Digital Communications

Mathematics: Probability, Stochastic Systems and Analysis

- Math 171: Fundamental concepts of Real Analysis
- Stats 310A: Theory of Probability Part A - Measure Theoretic treatment of probability
- Stats 310B: Theory of Probability Part B - Conditional Expectations, Discrete time Martingale and Renewal processes
- Stats 217: Introduction to Stochastic Processes - Part A of two part course on Markov Chains
- Stats 218: Introduction to Stochastic Processes - Part B of two part course on Markov Chains
- MS&E 321: Stochastic Systems - Markov Chains with general state space (Harris recurrence), Brownian Motion and Renewal Theory

Machine Learning and Signal Processing

- Stats 315A: Modern Applied Statistics: Elements of Statistical Learning.
- CS 228: Probabilistic Graphical Models.
- EE378A: Statistical Signal Processing - Spectral methods, Wiener and Kalman Filters, Particle filters and Discrete Denoising
- EE378B: Statistical Signal Processing (audit) Modern techniques for signal processing on graphs and matrices. Clustering, graph localization, fast methods for numerical linear algebra and collaborative filtering
- EE261: The Fourier Transform and its Applications
- EE278: Introduction to Statistical Signal Processing

Optimization and Discrete Algorithms

- EE364A: Convex Optimization
- MS&E 315: Discrete Mathematics and Algorithms
- MS&E 309: Randomized Algorithms

Dynamical Systems and Game Theory

- EE263: Introduction to Linear Dynamical Systems
- EE363: Linear Dynamical Systems - State space control methods and stability analysis using Lyapunov methods, Linear matrix inequalities and the S-procedure
- MS&E 246: Game Theory with Engineering Applications
- MS&E 336: Topics in Game Theory with Engineering Applications

Appendix B: Patents and Publications

Patent

1. "Accurate mobile Traffic Information Acquisition with Minimal Transmission Cost and Optional V2V Extension", S.H. Lim, Y.K. Chia and L. Wynter. Patent filed in The United States of America. Patent number: ASN920150001US1

Journal

1. K. Kittipong, Y.K. Chia, M. Skoglund, T. Oechtering and T. Weissman, "Secure Source Coding with a Public Helper", *IEEE Transactions on Information Theory*, July 2016.

2. K. Kittipong, M. Skoglund, T. Oechtering and Y.K. Chia, "Secure Source Coding With Action-Dependent Side Information", *IEEE Transactions on Information Theory*, December 2015.

3. Y.K. Chia and H.F. Chong "On Lossy Source Coding With Side Information Under the Erasure Distortion Measure", *IEEE Transactions on Information Theory*, December 2015.

4. X. Kang, H.F. Chong, Y.K. Chia, and S.M. Sun, "Ergodic Sum-Rate Maximization for Fading Cognitive Multiple-Access Channels Without Successive Interference Cancellation", *IEEE Transactions on Vehicular Technology*, September 2015.

5. H. Kim, Y.K. Chia and A. El Gamal "A Note on Broadcast Channels with Stale State Information at the Transmitter", *IEEE Transactions on Information Theory*, July 2015.

6. Y.K. Chia, S.M. Sun and R. Zhang "Energy Cooperation in Cellular Networks with Renewable Powered Base Stations", *IEEE Transactions on Wireless Communications*, December 2014.

7. X. Kang, Y.K. Chia, S.M. Sun and H.F. Chong, "Mobile Data Offloading through A Third-Party WiFi Access Point: An Operator's Perspective", *IEEE Transactions on Wireless Communications*, October 2014.

8. X. Kang, Y.K. Chia, C. K. Ho and S.M. Sun "Cost minimization for fading channels with energy harvesting and conventional energy", *IEEE Transactions on Wireless Communications*, August 2014.

9. J.G. Joung, Y.K. Chia and S.M. Sun, "Energy-Efficient, Large-scale Distributed-Antenna System (L-DAS) for Multiple Users", *IEEE Journal of Selected Areas in Signal Processing*, August 2014.

10. L. Zhao, Y.K. Chia and T. Weissman, "Compression with Actions", *IEEE Transactions on Information Theory.* Feb 2014.

11. Y.K. Chia, R. Soundararajan and T. Weissman , "Estimation with a helper who knows the interference," *IEEE Transactions on Information Theory,*. Nov 2013.

12. Y.K. Chia, H. Asnani and T. Weissman, "Multiterminal Source Coding with Action Dependent Side Information", *IEEE Transactions on Information Theory,* June 2013.

13. Y.K. Chia and A. El Gamal, "Wiretap Channel With Causal State Information," *IEEE Transactions on Information Theory* vol.58, no.5, pp.2838-2849, May 2012.

14. Y.K. Chia and A. El Gamal , "Three-Receiver Broadcast Channels With Common and Confidential Messages," *IEEE Transactions on Information Theory*, vol.58, no.5, pp.2748-2765, May 2012.

15. Y.K. Chia, H. Permuter and T. Weissman, "Cascade, Triangular and Two Way Source Coding with degraded side information at the second user", *IEEE Transactions on Information Theory*, vol.58, no.1, pp.189-206, Jan. 2012.

Conferences

1. S.H. Lim, Y.K. Chia and L. Wynter "Efficient Real-Time Mobile Traffic Information Acquisition", *IEEE TENCON*, 2016

2. Y. K. Chia, C. K. Ho and S. Sun, "Data Offloading with Renewable Energy Powered Base Station Connected to a Microgrid", *IEEE Globecom*, 2014

3. X. Kang, H. F. Chong, Y. K. Chia and S. Sun, "Sum-Rate Maximization for Spectrum-Sharing Cognitive Multiple Access Channels without Successive Interference Cancellation", *IEEE Globecom*, 2014

4. Y. K. Chia, "On Multiterminal Source Coding with list decoding constraint", *IEEE International Symposium for Information Theory*, 2014.

5. Y. K. Chia and H. F. Chong, "On lossy source coding with side information under the erasure distortion measure", *IEEE International Symposium for Information Theory*, 2014.

6. U. Sethakaset; Y.K. Chia; S.M. Sun "Energy Efficient WiFi Offloading for Cellular Uplink Transmissions" *IEEE Vehicular Technology Conference (Spring)*, 2014.

7. X. Kang, Y. K. Chia, C. K. Ho and S.M. Sun, "Cost minimization for fading channels with energy harvesting and conventional energy", *IEEE Conference on Communications*, 2014.

8. X. Kang, Y. K. Chia and S. M. Sun, "Mobile Data Offloading through A Third-Party WiFi Access Point: An Operator's Perspective", *IEEE Global Communications Symposium Heterogeneous Networks Workshop 2013*

9. J.G. Joung, Y.K. Chia and S.M. Sun, "Energy Efficient Multiuser MIMO Systems with Distributed Transmitters", *IEEE Global Communications Symposium 2013*

10. L.H. Dong, S.M. Sun, X. Zhu and Y. K. Chia, "Power Efficient 60 GHz Wireless Communication Networks with Relays", *Personal, Indoor, Mobile and Radio Communications 2013*

11. K. Kittipong, Y.K. Chia, M. Skoglund, T. Oechtering and T. Weissman, "Secure Source Coding with a Public Helper", *International Symposium on Information Theory 2013*

12. Y.K. Chia and K. Kittipong, "On secure source coding with side information at the encoder", *International Symposium on Information Theory 2013*

13. Y.K. Chia, S.M. Sun and R. Zhang "Energy Cooperation in Cellular Networks with Renewable Powered Base Stations", *IEEE Wireless Communications and Networking Conference 2013*

14. Y.K. Chia, R. Soundararajan and T. Weissman , "Estimation with a helper who knows the interference," *International Symposium on Information Theory* 1-6 July 2012 pp.706-710

15. L. Zhao and Y.K. Chia, "The efficiency of common randomness generation", *49th Annual Allerton Conference on Communication, Control, and Computing* 28-30 Sept. 2011 pp. 944 - 950

16. L. Zhao, Y.K. Chia and T. Weissman, "Compression with Actions", *49th Annual Allerton Conference on Communication, Control, and Computing* 28-30 Sept. 2011 pp. 164 - 171

17. Y.K. Chia, H. Asnani and T. Weissman, "Multiterminal Source Coding with Action Dependent Side Information", *International Symposium on Information Theory*, July 31 2011-Aug. 5 2011 pp. 2035 - 2039

18. Y.K. Chia and T. Weissman, "Cascade and Triangular source coding with causal side information", *International Symposium on Information Theory*, July 31 2011-Aug. 5 2011 pp. 1683 - 1687

19. Y.K. Chia, H. Permuter and T. Weissman , "Cascade, Triangular and two way source coding with degraded side information at the second user," *48th Annual Allerton Conference on Communication, Control, and Computing* pp.760-767, Sept. 29 -Oct. 1 2010

20. Y.K. Chia and A. El Gamal, "Wiretap Channel With Causal State Information," *International Symposium on Information Theory* pp. 2548 - 2552, 13-18 June 2010

21. Y.K. Chia and A. El Gamal, "3-Receiver broadcast channels with common and confidential messages," *International Symposium on Information Theory* pp.1849-1853, June 28 2009-July 3 2009

Appendix C: List of Potential Referees

- Professor Abbas El Gamal. Stanford University, Department of Electrical Engineering

- Professor Tsachy Weissman. Stanford University, Department of Electrical Engineering

- Dr. Shonali Krishnaswamy, Chief Technology Officer, AIDA Technologies Pte Ltd

- Dr. Sun Sumei, Head Communications and Networking Cluster, Institute for Infocomm Research

- Professor Haim Permuter. Ben Gurion University, Department of Electrical and Computer Engineering

- Professor Rajiv Soundararajan. Indian Institute of Science, Bangalore, Department of Electrical Communication Engineering