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Research Interests

My research interests are mainly in developing novel computational techniques, including **machine learning**, **statistics** and **model checking** techniques, for the analysis of high-throughput data, network inference, model verification and computational modeling of complex systems.

Education

- 09/2009 – Present **Postdoctoral Fellow**
Computer Science Department, Carnegie Mellon University (CMU)
Supervisor: **Edmund Clarke** (*2007 Turing Award*)
NSF Expedition Project – *Model Checking & Systems Biology of Pancreatic Cancer*
- 08/2002 – 08/2009 **Doctor of Philosophy**
Department of Physics, Carnegie Mellon University
Advisors: **Russell Schwartz** (Biology & CS), **Michael Widom** (Physics)
PhD Dissertation: *Computational Models of Protein Sorting in the Golgi Apparatus*
- 08/2006 – 05/2008 **Master of Science**, Department of **Statistics**, CMU
- 08/2002 – 05/2004 **Master of Science**, Department of Physics, CMU
- 09/1999 – 07/2002 **Master of Science**, Institute of High Energy Physics
Chinese Academy of Sciences
M.S. Thesis: *Phenomenological Analysis of Heavy Meson Decays*
- 09/1996 – 07/1999 **Bachelor of Science**, Department of Physics
Qingdao University, Qingdao, P.R. China

Research Experience

- 2009– Present **Postdoctoral Research** (Supervisor: Prof. **Edmund Clarke**)
Computer Science Department, Carnegie Mellon University
- Develop and apply machine learning/statistics methods to identify the genetic signatures & signaling pathways directly related to pancreatic cancer survival from high-throughput microarray data.
 - Develop Statistical Model Checking technique to investigate different signaling pathways in the pancreatic cancer;
 - Develop Boolean network models and Symbolic Model Checking method to study the key signaling pathways frequently mutated in the pancreatic cancer, and the linkage between hepatitis B virus (HBV) and cancer;
- 2005– 2009 **Research Assistant** (PhD Research Advisor: Prof. **Russell Schwartz**)
Department of Biological Sciences & Physics, Carnegie Mellon University
- *PhD Dissertation*: Develop discrete, stochastic models to investigate the mechanisms of Golgi biogenesis and protein sorting in the ER-Golgi network which is of importance in the cancer and Alzheimer's disease.
- 2004– 2005 **Research Assistant** (Advisor: Prof. Leonard Kisslinger)
Department of Physics, Carnegie Mellon University
- Develop mathematical models to simulate the electromagnetic field creation during the electroweak phase transition based on Quantum Chromodynamics theory and Supersymmetric Standard Model.
- 2000 – 2002 **Research Assistant** (MS Advisor: Prof. Dongsheng Du)
Chinese Academy of Sciences
- Develop computational models to study the B and D mesons' decays to two light particles and investigate the charge-parity (CP) violations based on QCD factorization theory.

Academic Awards

2010	Best Paper Award , International Conference on Bioinformatics (InCoB'10)
2009	“Honorable Mention” Student Paper Award, International Conference on Information and Communication Technologies and Development
2011	Travel Award, SB5.0 International Meeting on Synthetic Biology
2010	Travel Award, Systems Biology of Stem Cells

Publications

Peer-reviewed Research Papers

1. T T Wu, **Haijun Gong**, E. M. Clarke “A Transcriptome Analysis by Lasso Penalized Cox Regression for Pancreatic Cancer Survival”, *Journal of Bioinformatics and Computational Biology*, Vol. 9 (2011)
2. **Haijun Gong**, P. Zuliani, Q. Wang, E. M. Clarke. “Formal Analysis for Logical Models of Pancreatic Cancer” *50th IEEE Conference on Decision and Control and European Control Conference* (2011)
3. **Haijun Gong**, P. Zuliani, E. Clarke, “Model Checking of a Diabetes-Cancer Model”, *International symposium on computational models for life sciences (CMLS-11), AIP Conf. Proc. 1371* (2011)
4. **Haijun Gong**, Q. Wang, P. Zuliani, J. Faeder, M. Lotze, E. Clarke, “Symbolic Model Checking of Signaling Pathways in Pancreatic Cancer”, *Proceedings of ISCA 3rd International Conference on Bioinformatics and Computational Biology (BICoB)* (2011)
5. **Haijun Gong**, P. Zuliani, A. Komuravell, J. Faeder, E. Clarke, “Analysis and Verification of the HMGB1 Signaling Pathway”, *BMC Bioinformatics*, 11 (2010)
6. **Haijun Gong**, P. Zuliani, A. Komuravell, J. Faeder, E. Clarke, “Computational Modeling and Verification of Signaling Pathways in Cancer”, *Algebraic and Numeric Biology (2010), Lecture Notes in Computer Science*, 6479 (2012).
7. **Haijun Gong**, Y. Guo, A. Linstedt, R. Schwartz, “Discrete, Continuous and Stochastic Models of Protein Sorting in the Golgi”, *Physical Review E, Volume 81* (2010)
8. G. Ayorkor Korsah, J. Mostow, MB Dias, TM Sweet, S. Belousov, MF Dias, **Haijun Gong**, “Improving Child Literacy in Africa: Experiments with an Automated Reading Tutor”, *Information Technologies & International Development* (2010)
9. G. Ayorkor Mills-Tetty, J. Mostow, MB Dias, TM Sweet, S. Belousov, MF Dias, **Haijun Gong**, “Improving Child Literacy in Africa: Experiments with an Automated Reading Tutor”, *International Conference on Information and Communication Technologies & Development* (2009)
10. **Haijun Gong**, D. Sengupta, A. Linstedt, R. Schwartz, “Simulated *de novo* Assembly of Golgi Compartments by Selective Cargo Capture During Vesicle Budding and Targeted Vesicle Fusion”, *Biophysical Journal*, Volume 95 (2008)
11. **Haijun Gong**, Junfeng Sun, Dongsheng Du, “Analysis of $D_s \rightarrow \Phi J$ Beyond Naïve Factorization”, *High Energy Physics and Nuclear Physics*, Volume 26 (2002)
12. D. Du, **Haijun Gong**, J. Sun, D. Yang, G. Zhu, “Phenomenological Analysis of Charmless Decays $B \rightarrow PV$ with QCD Factorization”, *Physical Review D* 65, 094025 (2002)
13. D. Du, **Haijun Gong**, J. Sun, D. Yang, G. Zhu, “Phenomenological Analysis of $B \rightarrow PP$ Decays with QCD Factorization”, *Physical Review D* 65, 074001 (2002)

Conference Abstracts & Dissertation

14. **Haijun Gong**, P. Zuliani, Q. Wang, M. Lotze, J. Faeder, E. Clarke “Model Checking of Signaling Pathways in Pancreatic Cancer”, *5th International Meeting on Synthetic Biology* (2011)
15. **Haijun Gong**, P. Zuliani, J. Faeder, E. Clarke, “Computational Simulation and Verification of HMGB1 Signaling Pathway”, *9th Annual International Conference on Computational Systems Bioinformatics*, Stanford, CA, (2010)
16. **Haijun Gong**, P. Zuliani, J. Faeder, E. Clarke, “Computational Modeling of HMGB1 Signaling Pathway in Cancer and Model Checking”, *Systems Biology of Stem Cells Symposium*, Irvine (2010)

17. **Haijun Gong**, R. Schwartz, “Discrete and continuous models of protein sorting in the Golgi”, *American Physical Society (APS) March Meeting*, Pittsburgh (2009)
18. **Haijun Gong**, Y. Guo, A. Linstedt, R. Schwartz, “Discrete, Continuous and Stochastic Models of Protein Sorting in the Golgi”, *Computational Cell Biology*, Cold Spring Harbor, NY, (2009)
19. **Haijun Gong**, Y. Guo, A. Linstedt, R. Schwartz, “Computational Models of Protein Sorting in the Golgi”, *8th Annual Pittsburgh Symposium on Intracellular Membrane Traffic*, Pittsburgh (2009)
20. **Haijun Gong**, “Computational Models of Protein Sorting in the Golgi Apparatus”, *PhD Dissertation*, Carnegie Mellon University (2009)

Professional Activities

Journals Reviewer

Journal of Theoretical Biology; Journal of Chemical Physics; Biophysical Journal; Mathematical Biosciences; Computers in Biology and Medicine; Journal of Molecular Modeling; Applied Physics Letters; Journal of Applied Physics; European Physical Journal; PLoS Computational Biology; International Journal of Biomathematics; Computational & Mathematical Methods in Medicine; Bioinformatics and Biology Insights.

Book Reviewer

Handbook of Research on Computational & Systems Biology: Interdisciplinary Applications

Conference Committee Member

2010, 2011 International Conference on Computational and Systems Biology (ICCSB), China

Membership

International Society for Computational Biology (ISCB); Biophysical Society;
American Physical Society (APS); International Society for Computers and Their Applications;

Core Courses Taken at CMU

PhD & MS Courses in **Machine Learning, Computer Science, Computational Biology, Statistics, Physics**
Machine Learning, Statistical Machine Learning, Multimedia Databases and Data Mining, Data Structure and Algorithm, Algorithm Design and Analysis, Algorithm in the Real World, Computational Molecular Biology & Genomics, Computational Methods for Biological Modeling and Simulation...

Probability and Statistics, Intermediate Probability, Intermediate Statistics, Linear Model and Experimental Design, Regression Analysis, Statistical Computing, Applied Bayesian Methods...

Quantum Mechanics (Quantum Field Theory), Gauge Field Theory, Nuclear Physics & Particle Physics (I, II), Astrophysics, Thermal Dynamics and Statistical Mechanics, Mathematical Methods for Physicist ...

Others

P.R. China Citizenship & USA Permanent Resident (USA Green Card Holder)

References

- **Dr. Edmund M. Clarke** (Post doctorate Supervisor)
University Professor
Co-recipient of 2007 ACM Turing Award
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Carnegie Mellon University
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- **Dr. Russell Schwartz** (PhD Advisor)
Professor
Co-Director, Joint CMU/Pitt Ph.D. Program in Computational Biology
Lane Center for Computational Biology & Department of Biological Sciences
Carnegie Mellon University
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- **Dr. James R Faeder**
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- **Dr. Michael Widom** (PhD co-Advisor)
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- **Dr. Tong Tong Wu**
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