

Brian Thompson

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CURRICULUM VITAE

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Education

- **Rutgers University** Piscataway, NJ
Ph.D. in Computer Science January 2014
 - Advisor: S. Muthu Muthukrishnan
 - Thesis: Models and Algorithms for Event-Driven Networks
- **Carnegie Mellon University** Pittsburgh, PA
B.S. in Computer Science, Double Major in Discrete Math and Logic May 2006

Research Interests

- Network Dynamics, Complex Systems, Stochastic Models, Time Series Models
- Graph Algorithms, Streaming Algorithms, Data Mining, Machine Learning
- Information Diffusion, Influence, Community Discovery and Evolution
- Cyber Security, Anomaly Detection, Security and Privacy in Data Sharing
- Graph Theory, Combinatorics, Cryptography, Complexity, Game Theory

Publications (available at <http://pidancer.com/research/publications.html>)

- 1) “**Controlling Risk of Data Exfiltration in Cyber Networks Due to Stealthy Propagating Malware.**” Brian Thompson, James Morris-King, and Hasan Cam. *Proceedings of the Conference on Military Communications (MILCOM)*. Baltimore, Maryland, USA. November 2016.
- 2) “**Slowing the Spread of Bluetooth-based Malware in Mobile Tactical Networks.**” Brian Thompson, James Morris-King, and Richard Harang. *Proceedings of the Conference on Military Communications (MILCOM)*. Baltimore, Maryland, USA. November 2016.
- 3) “**Effectiveness of Proactive Reset for Mitigating the Impact of Stealthy Attacks on Cyber Networks.**” Brian Thompson, James Morris-King, and Hasan Cam. *Proceedings of the CNS International Workshop on Cyber-Physical Systems Security (CPS-Sec)*. Philadelphia, Pennsylvania, USA. October 2016.
- 4) “**The Impact of Hierarchy on Bluetooth-Based Malware Spread in Mobile Tactical Networks.**” Brian Thompson and James Morris-King. *Proceedings of the 48th Summer Computer Simulation Conference (SCSC)*. Montréal, Québec, Canada. July 2016.
- 5) “**Attacker Skill, Defender Strategies, and the Effectiveness of Migration-based Moving Target Defense in Cyber Systems.**” Noam Ben-Asher, James Morris-King, Brian Thompson, and William Glodek. *Proceedings of the 11th International Conference on Cyber Warfare and Security (ICWS)*. Boston, Massachusetts, USA. March 2016.
- 6) “**Discovering Functional Communities via Co-clustering of Sparse Matrices.**” Brian Thompson, Linda Ness, David Shallcross, and Devasis Bassu. *Proceedings of the 1st ICDM Workshop on Data Mining in Social Networks (DMSN)*. Atlantic City, New Jersey, USA. November 2015.

- 7) **“Efficient and Time Scale-Invariant Detection of Correlated Events in Communication Networks.”** Brian Thompson and James Abello. *Proceedings of the 5th ICDM Workshop on Data Mining in Networks (DaMNet)*. Atlantic City, New Jersey, USA. November 2015.
- 8) **“Inferring Pairwise Influence from Encrypted Communication.”** Brian Thompson and Hasan Cam. *Proceedings of the Conference on Military Communications (MILCOM)*. Tampa, Florida, USA. October 2015.
- 9) **“Modeling the Heart as a Communication System.”** Hiroshi Ashikaga, José Aguilar-Rodríguez, Shai Gorsky, Elizabeth Luszczek, Flávia Maria Darcie Marquitti, Brian Thompson, Degang Wu, and Joshua Garland. *Journal of the Royal Society Interface*. Volume 12, Issue 105. March 2015.
- 10) **“Modeling the Impact of Patron Screening at an NFL Stadium.”** Brian C. Ricks, Brian Nakamura, Alper Almaz, Robert DeMarco, Cindy Hui, Paul Kantor, Alisa Matlin, Christie Nelson, Holly Powell, Fred Roberts, and Brian Thompson. *Proceedings of the Industrial and Systems Engineering Research Conference*. Montreal, Canada. May 2014.
- 11) **“Modeling Collaboration in Academia: A Game Theoretic Approach.”** Graham Cormode, Qiang Ma, S. Muthukrishnan, and Brian Thompson. *Proceedings of the 1st WWW Workshop on Big Scholarly Data: Towards the Web of Scholars*. Seoul, Korea. April 2014.
- 12) **“Socializing the h-index.”** Graham Cormode, Qiang Ma, S. Muthukrishnan, and Brian Thompson. *Journal of Informetrics*. Volume 7, Issue 3, Pages 718-721. July 2013.
- 13) **“Towards Publishing Recommendation Data With Predictive Anonymization.”** Chih-Cheng Chang, Brian Thompson, Hui (Wendy) Wang, and Danfeng Yao. *Proceedings of the 5th ACM Symposium on Information, Computer and Communications Security (ASIACCS)*. Pages 24-35. Beijing, China. April 2010.
- 14) **“Privacy-Preserving Computation and Verification of Aggregate Queries on Outsourced Databases.”** Brian Thompson, Stuart Haber, William G. Horne, Tomas Sander, and Danfeng Yao. *Proceedings of the 9th International Symposium on Privacy Enhancing Technologies (PETS)*. Pages 185-201. Seattle, Washington, USA. August 2009.
- 15) **“The Union-Split Algorithm and Cluster-Based Anonymization of Social Networks.”** Brian Thompson and Danfeng Yao. *Proceedings of the 4th ACM Symposium on Information, Computer and Communications Security (ASIACCS)*. Pages 218-227. Sydney, Australia. March 2009.

Professional Experience

- **Research in Network Science and Cyber Security**
Fall 2014 – Present
With Dr. Ananthram Swami and Dr. Hasan Cam
U.S. Army Research Lab
 - Developed proactive cyber defense strategies to limit the potential damage from stealthy propagating malware, implemented and evaluated using agent-based simulation
 - Developed platform migration-based moving target defense against cyber attack
 - Developed and implemented an algorithm to infer network structure from encrypted radio communication
- **Research in Complex Systems**
Summer 2014
With SFI-affiliated faculty and other researchers
Santa Fe Institute
 - Developed methods to characterize abnormal heart rhythms using coarse-grained data from electrical sensors
 - Developed and implemented computational methods to predict the effects of pesticides on the stability of the soil ecosystem

- **Internship** Summer 2012 – Fall 2012
With Drs. D. Egan, J. Wullert, D. Bassu, L. Ness *Applied Communication Sciences*
 - Helped build an information retrieval system for a large corpus of intelligence data
 - Developed and implemented efficient algorithms to identify latent associations in the data
- **Research in Analytics for Homeland Security** Spring 2012 – Summer 2012
With Dr. Fred Roberts and Dr. Paul Kantor *Rutgers University*
 - Worked with the security team at a national sports stadium to improve the efficiency and effectiveness of inspection procedures at large venues
 - Developed computational and analytical tools currently used by five national sports stadiums
- **Internship** Summer 2009, Summer 2010
With Dr. Tina Eliassi-Rad *Lawrence Livermore National Lab*
 - Developed and implemented efficient algorithms for network-based anomaly detection
 - Developed models for evolution of social and communication networks
- **Research in Data Privacy and Security** Summer 2008 – Fall 2009
With Dr. Danfeng Yao *Rutgers University*
 - Designed a secure privacy-preserving protocol for outsourced databases
 - Developed and implemented utility-preserving anonymization algorithms for social networks and recommender systems

Teaching Experience

- **Data Structures and Algorithms** Summer 2008
TA for Dr. Louis Steinberg *Rutgers University*
 - Held recitation sections and office hours, graded homeworks and exams
- **Graduate Algorithms** Fall 2007, Spring 2008
TA for Dr. Michael Fredman and Dr. Endre Szemerédi *Rutgers University*
 - Held office hours, graded homeworks and exams
 - Gave lecture in professor's absence
- **Great Theoretical Ideas in Computer Science** Spring 2006
TA for Dr. Luis Von Ahn *Carnegie Mellon University*
 - Held recitation sections, office hours, and review sessions
 - Created and graded homeworks and exams
- **Discrete Mathematics** Fall 2003, Spring 2004, Fall 2004
TA for Dr. Richard Statman and Dr. John Mackey *Carnegie Mellon University*
 - Held recitation sections, office hours, and review sessions
 - Created and graded homeworks and exams
- **Andrew's Leap Summer Program** Summer 2003, 2004
Instructor under Dr. Steven Rudich *Carnegie Mellon University*
 - Summer program for advanced high school students
 - Taught classes on Programming, Graph Theory, and Combinatorial Games
 - Designed syllabus and supervised student projects

Professional Activities

- Founder and Organizer, ARL Young Researchers Interdisciplinary Seminar Series (2016)
- Program Committee, 25th ACM International Conference on Information and Knowledge Management (CIKM '16)
- Reviewer, Journal of Advanced Logic, Special Issue on Soft Computing Models in Industrial and Environmental Applications (2016)
- Reviewer, Journal of Discrete Applied Mathematics (2015)
- Program Committee, 24th ACM International Conference on Information and Knowledge Management (CIKM '15)
- Reviewer, Transactions on Large-Scale Data and Knowledge-Centered Systems (2015)
- Program Committee, 23rd ACM International Conference on Information and Knowledge Management (CIKM '14)
- Reviewer, Journal of Discrete Applied Mathematics (2014)
- Reviewer, IEEE Transactions on Information Forensics & Security (2013)
- Instructor, 4-H Summer Science Program for Urban Youth (Summer 2013)
- Committee Member, Computer Science Outreach Working Group (Spring 2012 – Summer 2012)
- Co-Organizer, CS4HS: Computer Science for High School Teachers Workshop (August 2012)
- Reviewer, IEEE Transactions on Information Forensics & Security (2012)
- Reviewer, Algorithmica (2012)
- Reviewer, 18th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD '12)
- Organizer, 1st Annual Rutgers Puzzle Hunt (February 2012)
- Organizer, DHS Student-run Seminar Series (Fall 2010, Spring 2011, Fall 2011)
- Student Organizer, 8F: DIMACS Workshop on Algorithms in the Field (May 2011)
- Student Organizer, DIMACS/CCICADA Student Workshop on Where the Mathematical and Computational Sciences Meet Society (April 2011)
- Reviewer, 17th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD '11)
- Reviewer, 5th IFIP International Conference on Trust Management (IFIPTM '11)
- Reviewer, 4th IFIP International Conference on Trust Management (IFIPTM '10)
- Reviewer, 19th International World Wide Web Conference (WWW '10)
- Reviewer, 18th International Conference on Computer Communications and Networks (ICCCN '09)
- Treasurer, Computer Science Graduate Student Society (2008 – 2009)

Workshop Papers, Posters, and Invited Talks

- **Mitigating Risk due to Undetected Malware Spread in Networks**
 - Network Frontier Workshop (NFW). Evanston, IL. December 2015. (Talk)
- **Non-linear Effects of Pesticides on Food Web Dynamics**
 - Conference on Complex Systems (CCS). Tempe, AZ. September 2015. (Talk)
- **Continuous-Time Stochastic Models for Event-Driven Networks**
 - Workshop on Dynamics Of and On Networks, Santa Fe Institute. Santa Fe, NM. December 2014. (Invited Talk)
- **Association Mining via Co-clustering of Sparse Matrices**
 - Command, Control, and Interoperability Center for Advanced Data Analysis (CCICADA) Research Retreat. Houston, Texas. April 2013. (Talk, Poster)
- **Puzzles to Algorithms: Making CS Fun for Students**
 - CS4HS: Computer Science for High School Teachers Workshop, Rutgers University. Piscataway, NJ. August 2012. (Invited Talk)
- **Streaming Models and Algorithms for Communication and Information Networks**
 - Command, Control, and Interoperability Center for Advanced Data Analysis (CCICADA) Research Retreat. Champaign-Urbana, Illinois. March 2012. (Talk)
 - Los Alamos National Lab. Los Alamos, NM. March 2012. (Invited Talk)
 - Applied Communication Sciences Corporate Headquarters. Piscataway, NJ. March 2012. (Invited Talk)
- **The Early Bird Gets the Buzz: Detecting Anomalies and Emerging Trends in Information Networks**
 - Doctoral Consortium at International Conference on Web Search and Data Mining (WSDM). Seattle, WA. February 2012. (Talk and Extended Abstract)
- **A Renewal Theory Approach to Anomaly Detection in Communication Networks**
 - DIMACS/CCICADA Interdisciplinary Seminar, Rutgers University. Piscataway, NJ. February 2011. (Invited Talk)
 - IBM T. J. Watson Research Center. Hawthorne, NY. January 2011. (Invited Talk)
 - National Association of Mathematicians, Undergraduate MathFest. Miami, FL. November 2010. (Invited Talk)
 - Command, Control, and Interoperability Center for Advanced Data Analysis (CCICADA) Research Retreat. Los Angeles, CA. October 2010. (Talk)
 - Bell Laboratories, Alcatel-Lucent. Murray Hill, NJ. October 2010. (Invited Talk)
 - Workshop on Information in Networks (WIN). New York, NY. September 2010. (Poster)
- **Anomaly Detection in Volatile Time-Evolving Networks**
 - Workshop on Information in Networks (WIN). New York, NY. September 2009. (Poster)
- **Privacy-Aware Publishing of Netflix Data**
 - IEEE Symposium on Security and Privacy. Oakland, CA. May 2009. (Poster)
- **Social Role-Preserving Graph Anonymization Using Clustering**
 - Security and Privacy Day. IBM T. J. Watson Research Center, NY. December 2008. (Poster)
 - Rutgers Corporate Computing Day. Piscataway, NJ. September 2008. (Poster)

Seminar Talks

- “**Modeling Collaboration in Academia: A Game Theoretic Approach**” Spring 2014
Center for Complex Network Research, Northeastern University
- “**Big Data for Goldfish: Streaming Algorithms with Limited Memory**” Summer 2012
Applied Research Seminar, Applied Communication Sciences
- “**The Fountain of Youth: Renewal Theory and Information Streams**” Spring 2012
Graduate Combinatorics Seminar, Rutgers University
- “**Have Your Cake and Eat It Too: Algorithms and Cake-Splitting**” Summer 2011
DHS High School Student Conference on Discrete Mathematics, Rutgers University
- “**Let 'Em Eat Cake: Fair, Envy-Free, and Equitable Division**” Spring 2010
Mathematics Graduate Student Seminar, Rutgers University
- “**Cluster-Based Anonymization of Social Networks**” Spring 2009
Compilers, OS, Architecture and Networks Seminar, Rutgers University
- “**The Zarankiewicz Problem and Other Extremal Sports**” Fall 2008
Graduate Combinatorics Seminar, Rutgers University
- “**Coloring in the Lines: Cool Edge-Colorings of Hypercubes**” Fall 2008
Mathematics Graduate Student Seminar, Rutgers University
- “**Computational Geometry and Art Galleries**” Fall 2007
Graduate Combinatorics Seminar, Rutgers University
- “**The Secret of Nim: An Intro to Combinatorial Game Theory**” Spring 2007
Mathematics Graduate Student Seminar, Rutgers University

Activities and Interests

- Community service, interfaith dialogue and social action
- STEM education and outreach
- Teaching (computer science, math, dance)
- Dancing (ballroom, square, contra)
- Capoeira (a Brazilian martial art)
- Recreational sports (soccer, ultimate frisbee, racquetball, table tennis, . . .)
- Making music (vocal or instrumental)
- Acting (especially musical theater)
- Juggling, reciting digits of π , juggling while reciting digits of π

References

- **Dr. Ananthram Swami**
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- **Dr. S. Muthu Muthukrishnan**
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- **Dr. Fred Roberts**
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- **Dr. Paul Kantor**
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- **Dr. Danfeng Yao**
 Assistant Professor
 Virginia Tech
 Department of Computer Science
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Teaching References

- **Frances P. Trees, DPS**
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 Rutgers, The State University of New Jersey
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