

Benjamin Edwards

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Education

University of New Mexico <i>PhD in Computer Science (with distinction)</i>	Albuquerque, NM May 2016
South Dakota School of Mines and Technology <i>BS in Applied and Computational Mathematics</i>	Rapid City, SD 2006
South Dakota School of Mines and Technology <i>BS in Computer Engineering</i>	Rapid City, SD 2006

PhD Dissertation

Evidence-based Cybersecurity: Data-driven and Abstract Models

Publications

Refereed Conference Papers.....

Benjamin Edwards, Steven Hofmeyr, Stephanie Forrest, and Michel van Eeten. Analyzing and modeling longitudinal security data: Promise and pitfalls. In *Proceedings of the 31st Annual Computer Security Applications Conference*, pages 391–400. ACM, 2015.

Benjamin Edwards, Steven Hofmeyr, and Stephanie Forrest. Hype and heavy tails: A closer look at data breaches **Best Paper**. In *Workshop on the Economics of Information Security*, June 2015.

Benjamin Edwards, Michael Locasto, and Jeremy Epstein. Panel summary: The future of software regulation. In *Proceedings of the 2014 workshop on New Security Paradigms Workshop*, pages 117–126. ACM, 2014.

Steven Hofmeyr, Tyler Moore, Stephanie Forrest, Benjamin Edwards, and George Stelle. Modeling internet-scale policies for cleaning up malware. In *Economics of Information Security and Privacy III*, pages 149–170. Springer, 2013.

Michael M Groat, Ben Edwards, James Horey, Wenbo He, and Stephanie Forrest. Enhancing privacy in participatory sensing applications with multidimensional data. In *Pervasive Computing and Communications (PerCom), 2012 IEEE International Conference on*, pages 144–152. IEEE, 2012.

Benjamin Edwards, Tyler Moore, George Stelle, Steven Hofmeyr, and Stephanie Forrest. Beyond the blacklist: modeling malware spread and the effect of interventions. In *Proceedings of the 2012 workshop on New security paradigms*, pages 53–66. ACM, 2012.

Refereed Journal Articles.....

Benjamin Edwards, Alexander Furnas, Stephanie Forrest, and Robert Axelrod. The blame game: Strategic aspects of cyber attack and attribution. *Proceedings of the National Academy of Sciences (In Review)*, 2017.

Melanie Moses, George Bezerra, Benjamin Edwards, James Brown, and Stephanie Forrest. Energy and time determine scaling in biological and computer designs. *Phil. Trans. R. Soc. B*, 371(1701):20150446, 2016.

Benjamin Edwards, Steven Hofmeyr, and Stephanie Forrest. Hype and heavy tails: A closer look at data breaches. *Journal of Cybersecurity (Early Access)*, December 2016.

Michael M Groat, Benjamin Edwards, James Horey, Wenbo He, and Stephanie Forrest. Application and analysis of multidimensional negative surveys in participatory sensing applications. *Pervasive and Mobile Computing*, 9(3):372–391, 2013.

Other Papers and Tech Reports

Benjamin Edwards and Jay Jacobs. Invited talk: Data analysis is the new risk analysis. *RSA Conference*, February 2017.

Benjamin Edwards. Invited Tutorial on Networkx: A Python Package for Network Analysis. In *Netsci X 2016, Wroclaw, PL*, January 2016.

Benjamin Edwards and Stephanie Forrest. How do complex systems protect themselves from malicious behavior. In *Conference on Complex Systems (to appear)*, September 2015.

Stephanie Forrest, Steve Hofmeyr, and Benjamin Edwards. The complex science of cyber defense. *Harvard Business Review*, June 2013.

Benjamin Edwards, Steven Hofmeyr, George Stelle, and Stephanie Forrest. Internet topology over time. *arXiv preprint arXiv:1202.3993*, 2012.

Benjamin Edwards. The immune system as a paradigm for social theory: A return to biology. In *Western Social Science Association Annual Conference*, April 2009.

Benjamin Edwards. Neural networks as social statistics: A comparison of logit and single layer feed forward perceptron networks. In *Western Social Science Association Annual Conference*, April 2008.

Benjamin Edwards. Using the growing neural gas algorithm to partition social networks. In *Western Social Science Association Annual Conference*, April 2007.

Jeff McGough, Karen Braman, and Benjamin Edwards. A numerical approach to the pohozaev identity. In *Mississippi State Conference on Differential Equations and Computer Simulations*, May 2005.

Benjamin Edwards. Approximating δ - covers for estimation of hausdorff dimension using genetic techniques. In *Midwest Instruction and Computing Symposium*, April 2005.

Academic and Professional Experience

IBM Research, Data Security Division

Yorktown Heights, NY

Postdoctoral Researcher under Suresh Chari

2016–Present

- Develop novel analytics for detecting malicious user behavior.
- Examine the relationship between vulnerability properties and security outcomes.
- Identify new password cracking techniques using deep learning

University of New Mexico, Dept. of Computer Science

Albuquerque, NM

Research Assistant

2009–2016

- Developed rigorous statistical models to identify trends in data breaches.
- Developed Markov models of website infection and search engine strategies to reduce user infections.
- Analyzed ten years of global spam data and developed statistical models testing the effectiveness of interventions.

New Mexico Institute for Social Research

Albuquerque, NM

Researcher

Jan 2007–May 2010

- Analyzed data and built statistical models of inmate populations, domestic abuse, and prison sentencing.

South Dakota School of Mines and Technology

Rapid City, SD

Research Assistant

Jun 2004–Sep 2004 and Jun 2005–Sep 2005

- Developed cellular automata toolkit for modeling bubonic plague spread in prairie dogs under Dr. Jeff McGough.
- Developed VHDL implementation of the Fast Fourier Transform under Dr. Brian Hemmelman.

MEMSense

Electronic Engineering Intern

- Data analysis, parts inventory database design and implementation, and wireless transceiver design.

Rapid City, SD

Apr 2003–Feb 2004

Teaching and Advisement

Univeristy of New Mexico, Dept. of Computer Science

Dissertation Committee Member, Xu Zhang

- **Dissertation Title:** Next Generation TCP/IP Side Channels

Albuquerque, NM

2016–Present

University of New Mexico, Dept. of Computer Science

Teaching Assistant

- CS 561: Graduate Data Structures and Algorithms

Albuquerque, NM

Aug 2009–Dec 2009

University of New Mexico, Dept. of Sociology

Teaching Assistant

- Soc 280: Introduction to Research Methods
- Soc 312: Causes of Crime
- Soc 381: Introduction to Social Statistics
- Soc 481L: Research Methods in Sociology Lab

Albuquerque, NM

Aug 2006–May 2009

South Dakota School of Mines and Technology

Teaching Assistant

- Math 120: College Algebra
- CS 150: Introduction to Computer Science
- EE 220: Introduction to Circuits
- EE 301: Introductory Circuits, Machines, and Systems

Rapid City, SD

Jan 2003–May 2006

Service

Workshop on Data Mining for Cyber Security

Program Committee

2016

Workshop on the Economics of Information Security

Program Committee

2016

New Security Paradigms Workshop

Program Committee

2013–2016

New Mexico Super Computing Challenge

Volunteer Scientific Adviser

Socorro, NM

September 2014

Study Group on Cybersecurity Experimentation of the Future

NSF Participant

Arlington, VA

March 2014

Reviewing

Journals

2012–Present

- Computers and Security
- Complex Adaptive Systems Modeling
- Journal of Artificial Life
- Journal of Complex Networks
- Journal of Cybersecurity
- Journal of Statistical Mechanics
- PLoS One
- Telecommunication Systems
- Transactions of Evolutionary Computation

Western Social Science Association

Panel Moderator

2007–2009

Honors and Awards

Best Paper <i>Workshop on the Economics of Information Security</i>	June 2015
Computer Science Student Conference Best Presentation <i>University of New Mexico</i>	April 2013
Outstanding Computer Science Graduate Student <i>University of New Mexico</i>	May 2012
Outstanding Mathematics Senior <i>South Dakota School of Mines and Technology</i>	April 4, 2006
Computer Engineering Outstanding Senior Award <i>South Dakota School of Mines and Technology</i>	April 4, 2006
Eta Kappa Nu <i>Electrical Engineering Honors Society</i>	April 2003–Present
Tau Beta Pi <i>Engineering Honors Society</i>	April 2005–Present
Grow Family Scholarship <i>South Dakota School of Mines and Technology</i>	2005
P. DeForrest & Edith M. McKeel Scholarship in Mathematics <i>South Dakota School of Mines and Technology</i>	2004, 2005
P. DeForrest & Edith M. McKeel Scholarship in Computer Engineering <i>South Dakota School of Mines and Technology</i>	2004
R. B. Hughes Memorial Scholarship in Computer Engineering <i>South Dakota School of Mines and Technology</i>	2003
Richard J. Monheim Scholarship in Computer Engineering <i>South Dakota School of Mines and Technology</i>	2002
Freshman University Scholarship <i>South Dakota School of Mines and Technology</i>	2001

Leadership

President: Computer Science Graduate Student Assoc. University of New Mexico	Sep 2010–Sep 2011
Board Member: Christine Duncan Community Charter School	Oct 2008–Nov 2009
Treasurer: Sociology Graduate Student Assoc. University of New Mexico	Sep 2006–Sep 2007
President: Mathematical Assoc. of America, South Dakota Sch. of Mines and Tech.	Sep 2004–May 2006
President: Hardrocker College Bowl Club, South Dakota Sch. of Mines and Tech.	Sept 2003–May 2005
Vice President: IEEE, South Dakota Sch. of Mines and Tech.	May 2003–May 2004
President: Student Ambassadors, South Dakota Sch. of Mines and Tech.	Aug 2002–May 2004

References

Contact information available upon request.

Stephanie Forrest

Dept. of Computer Science
University of New Mexico
Albuquerque, NM

Robert Axelrod

Gerald R. Ford School of Public Policy
University of Michigan
Ann Arbor, MI

Tyler Moore

Dept. of Computer Science
University of Tulsa
Tulsa, OK

Steven Hofmeyr

Lawrence Berkley National Lab
Berkeley, CA