# BRADFORD D. BOYLE

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## EDUCATION

**Doctor of Philosophy, Electrical Engineering** June 2015
Drexel University, Philadelphia, PA
Thesis: Achievable Schemes for Cost/Performance Trade-offs in Networks
Areas of Research: Source Coding, Combinatorial Optimization, Multiterminal Information Theory, Networking

**Master of Science, Electrical Engineering** June 2008
Drexel University, Philadelphia, PA

**Bachelor of Science, Electrical Engineering** (Summa Cum Laude) June 2006
Drexel University, Philadelphia, PA

## INDUSTRY EXPERIENCE

**VMware, Inc. (formerly Pivotal Software, Inc.)** Palo Alto, CA
*Staff Engineer* October 2016 to present

- Research & design engineer for Greenplum Database, an open-source massively parallel processing data platform based on PostgreSQL and designed to manage large scale analytic data warehouses & business intelligence workloads
- Developed Java-based Greenplum Platform Extension Framework that provides high throughput data access and federated query access across heterogeneous data sources via built-in connectors
- Developed Scala-based connector for Apache Spark (a unified analytics engine for large-scale data processing) to provide high speed, parallel data transfer between Greenplum & Spark clusters
- Maintained & extended Java-based connector for VMware GemFire (a data management platform that provides real-time, consistent access to data-intensive applications through distributed cloud architectures) to provide high speed, parallel data transfer between Greenplum and GemFire clusters
- Improved Greenplum installation packages for Debian & RedHat-based Linux operating systems
  - Updated packages to support installing multiple major versions of Greenplum to facilitate in-place upgrades
  - Re-architected continuous integration & deployment (CI/CD) pipelines in support of Greenplum 6
  - Maintained release pipelines for three major versions of Greenplum (4.3, 5, 6), averaging one release per week
- Provisioned & maintained in-house CI/CD systems based on Concourse CI
  - Provisioned infrastructure as a service (IaaS) resources across multiple public cloud providers using Terraform
  - Deployed over a dozen CI/CD systems with Cloud Foundry Bosh
  - Tuned CI/CD pipelines in collaboration with other teams for lower build times & cost savings

**Sift Security** Menlo Park, CA
*Data Scientist & Developer* September 2015 to October 2016

- Stealth mode enterprise security startup combining big data technologies, graph databases, and machine learning
- Contributed to the development of an ingestion pipeline utilizing Kafka, Spark, and HBase/Cassandra
- Facilitated the implementation of detection algorithms on a variety of data sources driven by security use-cases
- Member of a small team of developers in an Agile environment and served as scrum master
- Engaged with and supported pilot customers in deploying, utilizing, and leveraging Sift Security's platform
- Managed company infrastructure using AWS, LDAP, JIRA, GitLab, and Jenkins

**Cisco Systems, Inc** Boxborough, MA
*Software Engineer (Software Defined Networking Agent (SDNA) Graduate Intern)* June 2012 to September 2012

- Ported Open vSwitch to the Nexus 7000 line of switches to provide a proof-of-concept Openflow compatible Nexus 7000
- Developed a POX-based Openflow controller to demonstrate correct handling of flow rules and packet handling on the proof-of-concept Nexus 7000 Openflow agent

## PUBLICATIONS

**Journals**

1. J. Ren, B. D. **Boyle**, G. Ku, S. Weber, and J. M. Walsh, "Overhead performance tradeoffs—A resource allocation perspective," *IEEE Trans. Inf. Theory*, vol. 62, no. 6, Jun. 2016
2. B. D. **Boyle**, J. Ren, J. M. Walsh, and S. Weber, "Interactive scalar quantization for distributed resource allocation," *IEEE Trans. Signal Process.*, vol. 64, no. 5, Mar. 2016

**Conferences**

1. B. D. **Boyle** and S. Weber, "Primal-dual characterizations of jointly optimal transmission rate and scheme for distributed sources," in *Data Compression Conf. (DCC)*, March 2014
2. B. D. **Boyle**, J. M. Walsh, and S. Weber, "Distributed scalar quantizers for subband allocation," in *Conf. Information Sciences and Systems (CISS)*, March 2014
3. J. Hummel, A. McDonald, V. Shah, R. Singh, B. D. **Boyle**, T. Huang, N. Kandasamy, H. Sethu, and S. Weber, "A modular multi-location anonymized traffic monitoring tool for a WiFi network," in *ACM Conf. Data and Application Security and Privacy (CODASPY)*, March 2014, **Outstanding Poster Award**
4. B. D. **Boyle**, J. M. Walsh, and S. Weber, "Channel dependent adaptive modulation and coding without channel state information at the transmitter," in *IEEE Int. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, May 2013

## Research Experience

**Mining Large Graphs Through Subgraph Sampling** — Drexel University
*Investigators: Harish Sethu & Steven Weber* — October 2013 to August 2015

- National Science Foundation (NSF) Program for Big Data Science & Engineering, Award # 1250786
- Evaluated the use of real-world social networks (e.g., Twitter, Flickr, Foursquare) as representative data sets in developing and analyzing graph sampling algorithms
- Implemented several algorithms for estimating graph properties from sampled subgraphs and compared the performance of these different algorithms across families of randomly generated graphs and real-world social networks

**Securing the Wireless Philadelphia Network** — Drexel University
*Investigators: Steven Weber, Kapil Dandekar, Spiros Mancoridis, & Harish Sethu* — September 2012 to August 2015

- National Science Foundation (NSF) Program for Secure & Trustworthy Cyberspace, Award # 1228847
- Applied state measurement and aggregation techniques to both the host-based and network anomaly detection problems
- Advised a senior design team in developing a traffic monitoring tool for Wi-Fi networks
- Researched the impact of network capacity constraints on Slepian-Wolf source coding rate region
- Demonstrated a connection between conditional independence relationships amongst a set of sources and the complexity of linear programs over the feasible rate region

**Overhead-Performance Tradeoffs in Distributed Wireless Networks** — Drexel University
*Investigators: John MacLaren Walsh, Steven Weber, Leonard J. Cimini, & Javier Garcia-Frias* — May 2012 to May 2015

- Air Force Office of Scientific Research (AFOSR) Complex Networks Program, Award # FA9550-12-1-0086
- Studied the tradeoff between collaboration information overhead and bandwidth/energy efficiency of wireless networks
- Investigate the capacity loss for an optimized channel dependent adaptive modulation & coding (AMC) without channel state information (CSI) at the transmitter as compared to an omniscient transmitter
- Designed an low complexity achievable scheme for user feedback in resource allocation problems based on scalar quantization and demonstrated performance close too rate-distortion function for certain classes of sources

**ACIN Cognitive Networking** — Drexel University
*Investigators: Steven Weber & Kapil Dandekar* — September 2010 to May 2012

- U.S. Army Communications and Electronics Command (CECOM)
- Researched the applicability of cognitive networking for wireless networks by implementing and simulating standard ad hoc network and representative "cognitive" routing protocols
- Compared cross-layer cognitive designs that integrate state information for joint use at the PHY, MAC, and NET layers to standard and cognitive routing protocols
- Provided a preliminary implementation of backpressure routing in Linux for ad-hoc wireless networks

**ACIN CREW Network Centric Operations** — Drexel University
*Investigators: Moshe Kam & Kapil Dandekar* — June 2008 to September 2010

- U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC)

**ACIN Situation-Aware Protocols in Edge Network Technologies (SAPIENT)** — Drexel University
*Investigators: Moshe Kam & Spiros Mancoridis* — September 2006 to June 2008

- DARPA and Lockheed Martin Advanced Technology Labs (ATL)

## Skills and Assets

- Operating Systems: Windows XP/Vista/7/8/10, Mac OS X, Linux (CentOS, Debian, & Arch)
- Software: k8s, Docker, LaTeX, Microsoft Office Suite, MATLAB, Postgres, Elasticsearch, Logstash
- Hardware: Atmel AVR, Texas Instruments MSP430, Arduino, Raspberry Pi, BeagleBone Black
- Programming & Scripting: Bash, C/C++, Clojure, Go, HTML/CSS, Java, JavaScript, Python, Rust, Scala, Terraform
- Licensed Amateur Radio Operator—Amateur Extra Class (AB3MD)
- Boy Scouts of America, Eagle Scout