

# HARBOR LABS

SOFTWARE & NETWORKING EXPERTS

## Seth James Nielson, Ph.D.

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### Profile

I am a Principal at Harbor Labs with specialties in network security, network communications, software architecture, and programming languages. With over a decade of industry and academic experience providing software development, software reviews, security reviews, cryptographic analysis, and technical training, I enable clients to succeed in their technology projects. I also have extensive experience as a technical expert having supported legal teams with analysis and insight on patents, DMCA, code theft, and trade secrets. In addition to providing numerous code reviews, expert reports, and technical analyses, I have been deposed several times and have testified at trial.

I completed my Ph.D. at Rice University in 2009 where my thesis investigated questions of security and anonymity in peer-to-peer (P2P) systems like BitTorrent. In addition to my professional work at Harbor Labs, I am an Adjunct Associate Research Scientist at Johns Hopkins University where I teach network security classes, mentor student capstone projects, and engage in academic research.

### Education

<u>2009</u>	<i>Rice University</i>	<b>Ph.D. in Computer Science</b>
<u>2004</u>	<i>Brigham Young University</i>	<b>M.S. in Computer Science</b>
<u>2000</u>	<i>Brigham Young University</i>	<b>B.S. in Computer Science</b>

### Academics and Research

<u>12/2014-Present</u>	<i>Johns Hopkins University</i>	<b>Adjunct Associate Research Scientist</b>
	Teach graduate level courses on network security Advise student capstone projects Engage in academic research	

<u>1/2014-12/2014</u>	<i>Johns Hopkins University</i>	<b>Lecturer</b>
	Teach graduate level courses on network security Advise student capstone projects	

### Industry Positions

<u>2011-Present</u>	<i>Harbor Labs</i>	<b>Principal</b>
<u>2005-2011</u>	<i>Independent Security Evaluators</i>	<b>Senior Security Analyst</b>
<u>2005</u>	<i>Google</i>	<b>Summer Intern</b>
<u>2001-2003</u>	<i>Metrowerks (Formerly Lineo, Inc.)</i>	<b>Software Engineer II</b>

### Academic Awards

Brown Fellowship  
John and Eileen Tietze Fellowship

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## Patents

Co-inventor: Orsini, R. 2014. *Systems and methods for security data in motion*. U.S. Patent 8,745,372 filed November 24, 2010 and issued June 3, 2014.

Co-inventor: Orsini, R. 2014. *Systems and methods for security data in motion*. U.S. Patent 8,745,379 filed August 20, 2012 and issued June 3, 2014.

Co-inventor: O'Hare, R. 2014. *Systems and methods for security data*. U.S. Patent 8,677,148 filed January 27, 2012 and issued March 18, 2014.

## JHU MSSI Capstones

*Research on the Heartbleed Vulnerability*, Jingru Chen, Yaning Liu, Yifan Yu, Zhiyue Zu (May 2015)

*Buying Friends: Identifying Botnet Customers and Mapping Out Botnets on Twitter*, Richard Eaton (May 2015)

*Security Techniques for Developing iOS Applications*, Kartik Thapar (February 2015)

*Privacy and Threats in Bitcoin*, Jie Feng, Jianxiang Peng, Likai Zhang (January 2015)

## Publications

Seth James Nielson, *PLAYGROUND: Preparing Students for the Cyber Battleground*, Submitted to the Journal of Computer Science Education.

Aviel D. Rubin, Seth J. Nielson, Sam Small, Christopher K. Monson, *Guidelines for Source Code Review in Hi-Tech Litigation*, Harbor Labs White Paper (September 2013)

Seth James Nielson, *Reintroducing Pylogical*, BYU SEQuOIA Technical Report, (March 2012)

Seth James Nielson and Dan S. Wallach, *The BitTorrent Anonymity Marketplace*, arXiv Technical Report 1108.2718, (August 2011)

Seth James Nielson, Caleb E. Spare, and Dan S. Wallach, *Building Better Incentives for Robustness in BitTorrent*, arXiv Technical Report 1108.2716, (August 2011)

Seth James Nielson, *Designing Incentives for Peer-to-Peer Systems*, Rice University Department of Computer Science Ph.D. Thesis (2010)

Seth James Nielson and Charles D. Knutson, *Design Dysphasia and the Design Patterns Maintenance Cycle*. *Information & Software Technology*, volume 48, number 8, pp. 660- 675, (August 2006)

Seth James Nielson, Scott S. Crosby, and Dan S. Wallach, *A Taxonomy of Rational Attacks*. In *Proceedings of the Fourth International Workshop on Peer-to-Peer Systems (IPTPS '05)*, Ithaca, New York, (February 2005)

Seth James Nielson, *OO++ Design Patterns, GOF Revisited*, Brigham Young University Department of Computer Science Master's Thesis (2004)

Seth James Nielson, Seth J. Fogarty, and Dan S. Wallach, *Attacks on Local Searching Tools*, arXiv Technical Report 1108.2704 (Originally produced in December, 2004, available on arXiv as of August 2011)

Rob Kunz, Seth Nielson, Mark Clement, Quinn Snell, *Effective Bandwidth for Traffic Engineering*, in *Proceedings of the IEEE Workshop on High Performance Switching and Routing (HPSR 2001)*, Dallas, TX, (May 2001)

## Selected Consulting and Industry Experience

7/2015-Present    *Medical Device Security*

*Client:*        Confidential

*Overview:*    Ongoing security evaluation of medical devices from a major manufacturer

- Principal consultant for a one-year, multi-stage engagement
- On-site interviews and discussion with technical staff
- Evaluation of physical hardware and networks, design docs, etc.
- Confirmation of reported vulnerabilities
- Security recommendations for current and future products

10/2014-Present    *Device Certification Consulting*

*Client:*        Security First Corporation

*Overview:*    Evaluate devices and software against regulatory requirements

- Evaluate products against HIPAA, FISMA, SOX, GLBA, NERC, ISO 27002 requirements

8/2013-11/2014    *Privacy Analysis in Forensic Data Collection*

*Client:*        Center for Copyright Information

*Overview:*    Ensure that private information in copyright abuse tracking is adequately protected

- Interviews with technical staff
- Analysis of design and policy documents
- Recommendations for improved privacy protection
- Public executive summary available: <http://www.copyrightinformation.org/wp-content/uploads/2014/11/Harbor-Labs-Executive-Summary.pdf>

7/2011-12/2011    *Automated Security Tools*

*Client:*        Confidential

*Overview:*    Development of automated tools for security testing

- Development of an automated, parallelized code coverage tool based on gcov
- Development of a tool for fuzzing iOS applications

8/2005-9/2011    *Development of Security-Related Software*

*Client:*        Security First Corporation

*Overview:*    Development of cryptographic library and sundry applications

- Technical lead of a secure communication library including prototype, design, and implementation
- Deployment of custom cryptographic library to filesystem encryption

- Hardware acceleration for cryptographic operations using CUDA and GPUs
- Development of custom cryptographic library for data at rest and data in motion

Summer 2005     *Security Intern at Google*

*Overview:* Development of a fix for privacy loss in the Google Web Accelerator

- Analysis of the security flaw
- Design and implementation of a solution to the problem

1/2001-9/2003     *Software Engineer II at Metrowerks*

*Overview:* Development of various applications for embedded Linux development

- Technical lead for the development of the SDK UI
- Technical lead for the development of a software update packaging system
- Technical lead for the development of a transparent remote script system

## Technical Expertise

1/2001-Present     *Software Development*

*Languages:* C, C++, Java, Python, Objective-C, Assembly

*Targets:* Applications, libraries, device drivers, simulators, networking stacks, graphics, server code, security code, pedagogical tools, utilities, automation, GUIs, intrusion detection systems, attack simulation technology

*Toolkits:* QT, Boost, Twisted, SWIG, test harnesses, CUDA

*Platforms:* Windows, Linux, iOS

9/2004-Present     *Vulnerability and System Analysis*

*Examples:* Medical device security, Google Desktop Search (2004), crypto protocols, viruses, malware, passwords, cryptographic implementation, security policy viability, marketplace viability and risks of existing and future products

*Tools:* IDA Pro, port scanning, Formal cryptographic analysis tools, GCov and code coverage tools, fuzzing

1/2010-Present     *Source Code Review and Analysis*

*Samples:* Antivirus software, firewall software, high-frequency trading algorithms, wireless protocol implementations, intrusion prevention software, email server software, document signature software

*Tools:* Understand, customized scripts

1/2010-Present     *Technical Analysis of Intellectual Property*

*Issues:* DMCA and copyright

5/2010-Present     *Technical Instruction*

Teaching non-technical professionals about relevant high-tech operations

Teaching technical professionals about technologies relevant to intellectual property

9/2011-1/2012     *Technical Project Management*  
*Projects:*     Secure communication application, automated fuzzing tool  
*Internal:*     Coding guidelines, manpower allocation, quality assurance  
*Customer:*    Requirements analysis, budget and scheduling, conflict resolution

9/2005-9/2011     *Cryptographic Library Development*  
*Algorithms:*   AES-GMAC, Shamir Key Splitting, Client-custom algorithms  
*Special:*        GPU-accelerated AES (CUDA), file system integration, FIPS certified

## Expert Witness

3/2015-8/2015     *Afilias PLC v. Architelos Inc. and Alexa Raad*  
*Client:*             Afilias PLC  
*Counsel:*          Philip Hampton (of Haynes Boone)  
*Issues:*             Misappropriation of Proprietary Information  
*Technology:*        Domain name registrars, domain name anti-abuse  
*Status:*             Testified 8/2015, Deposed 6/2015

2/2015-Present     *Sensus USA Inc. v. Certified Measurement Inc.*  
*Client:*             Sensus USA  
*Counsel:*          Rafael A. Perez-Pineiro, Javier Sobrado (of Feldman Gale)  
*Issues:*             Claims construction, IPR  
*Technology:*        Cryptography, certified measurements  
*Status:*             Declaration submitted

12/2014-Present   *Chad Eichenberger v. ESPN*  
*Client:*             Chad Eichenberger  
*Counsel:*          David Mindell (of Edelson PC)  
*Issues:*             Declaration in support of amended claim  
*Technology:*        Privacy  
*Status:*             Declaration submitted

9/2014-Present     *Fortinet Inc. vs Sophos Inc., et al*  
*Client:*             Fortinet  
*Counsel:*          Michael Niu, Jordan Jaffe, Kristen Lovin (of Quinn Emanuel)  
*Issues:*             Claims construction, IPR, Infringement, Invalidity, Non-infringement  
*Technology:*        Network security devices, anti-virus, anti-spam  
*Status:*             Deposed 10/2014; Tech tutorial for Court 12/2014

3/2014-Present     *M2M Solutions vs Motorola Solutions, Telit Communications, and Telit Wireless*  
*Client:*             Telit  
*Counsel:*          David Loewenstein (of Pearl Cohen)  
*Issues:*             Collaborating expert on both patent infringement and invalidity  
*Technology:*        Authentication  
*Status:*             Deposed 6/2015

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