

# Anna Sperotto

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https://annasperotto.org

## RELEVANT EXPERIENCE

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- University of Twente, The Netherlands** **Oct 2019 -**  
Associate Professor  
Design and Analysis of Communication Systems Group  
Topics: Network Security, Network Monitoring and Measurements, Proactive Internet Security
- University of Twente, The Netherlands** **April 2015 - Sept 2019**  
Assistant Professor  
Design and Analysis of Communication Systems Group  
Topics: Network Security, Network Monitoring and Measurements, Traffic Modeling
- University of Twente, The Netherlands** **Nov. 2010 - April 2015**  
Post Doctoral researcher  
Design and Analysis of Communication Systems Group  
Topics: Network Security, Network Monitoring and Measurements, Traffic Modeling
- University of California, San Diego, USA** **January - March 2013**  
Visiting Researcher  
The Cooperative Association for Internet Data Analysis – CAIDA (Prof. kc claffy)  
Topics: Network Security, Botnet characterization, Network measurements
- Technical University Berlin, Berlin, Germany** **March 2012**  
Visiting Researcher  
Internet Architectures Group (Prof. A. Feldmann)  
Topics: Network Security, Network measurements

## EDUCATION

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- University of Twente, The Netherlands – PhD in Computer Science** **2006 - 2010**  
Thesis: *Flow-based Intrusion Detection*  
Promotor: Prof. dr. ir. B.R.H.M. Haverkort  
Assistant promotor: dr.ir. A. Pras  
Topics: Network Security, Network Monitoring, Traffic Modeling.
- University of Manchester, United Kingdom – Erasmus Project** **February 2006 - June 2006**  
Topics: Computer Vision, Data Clustering.
- Ca' Foscari University, Venice, Italy – MSc in Computer Science** **2004 - 2006**  
Thesis title: *Szemerédi's Regularity Lemma and its applications to Pairwise Clustering and Segmentation*  
Proposer: Prof. M. Pelillo  
Grade: 110/110 cum laude  
Topics: Computer Vision, Data Clustering
- Ca' Foscari University, Venice, Italy – BSc in Computer Science** **2001 - 2004**  
Thesis title: *Raggruppamento Percettivo e Insiemi Dominanti (Dominant Set and Perceptual Grouping)*  
Proposer Prof. M. Pelillo  
Grade: 110/110 cum laude  
Topics: Computer Vision, Data Clustering

## SELECTED PUBLICATIONS

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- van der Toorn, O. , van Rijswijk, R., Geesink, B., Sperotto, A. *Melting the Snow : Using Active DNS Measurements to Detect Snowshoe Spam Domains* IEEE/IFIP Network Operations and Management Symposium (NOMS 2018) *Best paper award*
- Jonker, M., Pras, A., Dainotti, A., Sperotto, A. *A First Joint Look at DoS Attacks and BGP Blackholing in the Wild* 2018 ACM Internet Measurement Conference (IMC 2018)
- Jonker, M., King, A., Krupp, J., Rossow, C., Dainotti, A., Sperotto, A., *A Third of the Internet is Under Attack: a Macroscopic Characterization of the DoS Ecosystem*, In Proceedings of the ACM Internet Measurement Conference 2017 (IMC 2017)

- van Rijswijk-Deij, R., Hageman, K., Sperotto, A. and Pras, A. *The Performance Impact of Elliptic Curve Cryptography on DNSSEC Validation*, In IEEE/ACM Transactions on Networking, Volume 25, Issue 2, April 2017, awarded with an **IRTF Applied Networking Research Prize 2017**)
- Jonker, M., Sperotto, A., van Rijswijk-Deij, R., Sadre, R. and Pras, A., *Measuring the Adoption of DDoS Protection Services*, In Proceedings of the ACM Internet Measurement Conference 2016 (IMC 2016)
- van Rijswijk-Deij, R., Sperotto, A. and Pras, A. *DNSSEC and its potential for DDoS attacks – a comprehensive measurement study*, ACM Internet Measurements Conference 2014 (IMC 2014) (acceptance rate 22.9%, awarded with the **ACM IMC Community Contribution Award** and with an **IRTF Applied Networking Research Prize 2015**)
- Hofstede, R., Drago, I., Sadre, R., Sperotto, A., and Pras, A. *Measurement artifacts in Netflow/IPFIX data*, Proceedings of the Passive and Active Measurement conference (PAM 2013), 18-20 May 2013, Hong Kong, China (Acceptance rate: 32.4% - **Best Paper Award**)
- Drago, I., Mellia, M., Munafò, M.M, Sperotto, A., Sadre, R. and Pras, A. Inside Dropbox: Understanding Personal Cloud Storage Services. In: ACM SIGCOMM Internet Measurement Conference, IMC 2012, 14-16 Nov 2012, Boston, USA (90 citations, Acceptance rate: 24% - **Awarded with the IRTF Applied Research Network Prize 2013**)

## PROJECTS

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- MADDVIPR - Mapping DNS DDoS Vulnerabilities to Improve Protection and Prevention (NWO-DHS project, 2018 - 2022) – **Principal Investigator**
- TIDE - Threat Identification using active DNS measurements ( SIDNfonds Call for scientific research) – **Principal Investigator**
- D<sup>3</sup> Distributed Denial-of-Service Defense: protecting schools and other public organizations (NWO Cyber Security Program, 2014 - 2018) – **Principal Investigator**
- FLAMINGO – Management of the Future Internet (FP7 - Network of Excellence, 2012-2016) – **WP leader**
- CAD – Cyber Attack Detector (Founded by AgentschapNL, research conducted in partnership with TNO, KLPD, Fox-IT and UvA) – **UT coordinator**
- SURFnet GigaPort 3 – Next Generation Infrastructures and SURFnet Research on Networking (Yearly founded by SURFnet, contributed in 2010, 2011, 2012, 2013, 2014)

## AWARDS AND HONORS

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<b>N2Women Rising Stars List 2019</b>	<b>2019</b>
<b>IRTF Applied Networking Research Prize 2017</b>	<b>2017</b>
For the paper <i>The Performance Impact of Elliptic Curve Cryptography on DNSSEC Validation</i> (R. van Rijswijk-Deij, K. Hageman, A. Sperotto and A. Pras – IEEE/ACM Transactions on Networking, 2016)	
<b>IRTF Applied Networking Research Prize 2015</b>	<b>2015</b>
For the paper <i>DNSSEC and its potential for DDoS attacks - a comprehensive measurement study</i> (R. van Rijswijk-Deij, A. Sperotto and A. Pras – ACM IMC 2014)	
<b>IRTF Applied Networking Research Prize 2013</b>	<b>2013</b>
For the paper <i>Inside Dropbox: Understanding Personal Cloud Storage Services</i> (Drago, I. and Mellia, M. and Munafò, M. M. and Sperotto, A. and Sadre, R. and Pras, A. – ACM IMC 2012)	
<b>Community Contribution Award at ACM IMC 2014</b>	<b>2014</b>
For the paper <i>DNSSEC and its potential for DDoS attacks - a comprehensive measurement study</i> (R. van Rijswijk-Deij, A. Sperotto and A. Pras – ACM IMC 2014)	
<b>Best paper award</b>	<b>2015</b>
For the paper <i>How asymmetric is the Internet? A Study to Support the use of Traceroute</i> (de Vries, W., Santanna, J.J., Sperotto, A., Pras. A. – AIMS 2015)	
<b>Best paper award</b>	<b>2013</b>
For the paper <i>Measurement artifacts in Netflow/IPFIX data</i> (Hofstede, R., Drago, I., Sadre, R., Sperotto, A., and Pras, A. – PAM 2013)	
<b>Best paper award</b>	<b>2012</b>
For the paper <i>SSHCure: A Flow-Based SSH Intrusion Detection System</i> (Hellemons, L., Hendriks, L., Hofstede, R., Sperotto, A., Sadre, R., Pras, A. – AIMS 2012)	
<b>Best paper award</b>	<b>2009</b>
For the paper <i>Hidden Markov Model modeling of SSH brute-force attacks</i> (Sperotto, A., Sadre, R., de Boer, P.T. and Pras, A. – DSOM 2009)	

<b>Professor De Winter Prize 2015</b>	<b>2015</b>
International publication award for highly talented female candidates at the University of Twente, for the paper <i>DNSSEC and its potential for DDoS attacks - a comprehensive measurement study</i> (R. van Rijswijk-Deij, A. Sperotto and A. Pras –IMC 2014)	
<b>UT stimuleringsfund grant</b> for performing a series of academic visit abroad	<b>2014</b>
<b>UT stimuleringsfund grant</b> for performing an extended academic visit abroad	<b>2012</b>
<b>Kivi Niria Telecommunication prize</b> , candidate for UTwente, second classified	<b>2012</b>
<b>Anita Borg Finalist</b> , Google	<b>2009</b>
<b>CTIT annual symposium on CreativeIT</b> , University of Twente, second classified	<b>2008</b>

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#### PHD SUPERVISION

- Ramin Yazdani (PhD candidate, 2019-2023, co-promotor) *Characterizing DDoS infrastructure*
- Raffaele Sommese (PhD candidate, 2018-2022, co-promotor) *DNS security*
- Olivier van der Toorn (PhD candidate, 2017-2021, co-promotor) *Proactive Threat Detection*
- Mattijs Jonker (PhD candidate, 2014-2018, co-promotor) *Distributed Denial-of-Service Defense – cum laude*
- Roland van Rijswijk-Deij (PhD candidate, 2014-2017, co-promotor) *DNS security – cum laude*
- Christian Dietz (PhD candidate, in collaboration with Universität der Bundeswehr München 2014-) *Botnet detection*
- Jessica Steinberger (PhD candidate, in collaboration with the Center for Advanced Security Research Darmstadt (CASED), Hochschule Darmstadt, 2014-2018, co-promotor) *A collaborative approach to DDoS defense*
- Rick Hofstede (PhD candidate, 2011-2015) *Real-time and Resilient Intrusion Detection: a Flow-based Approach*

#### Additional support:

- Luuk Hendriks (PhD candidate, 2014-2018) *Security in Software Defined Networking*
- Morteza Karimzadeh (PhD candidate, 2013-2017) *Software Defined Networking to Improve Mobility Management Performance*
- José Jair C. Santanna (PhD candidate, 2013-2017) *Detection and Mitigation of Distributed Denial of Service Attacks*
- Ricardo de Oliveira Schmidt (PhD November 2014) *Estimating Required Bandwidth using Flow-based measurements*
- Idilio Drago (PhD December 2013) *Monitoring Cloud Systems*
- Giovane C. M. Moura (PhD March 2013) *Internet Bad Neighborhoods*

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#### PHD DEFENSE COMMITTEE

- *The Blind Man and the Elephant: Measuring Economic Impacts of DDoS Attacks* Abhishta, U. of Twente, 2019
- *DDoS Mitigation: A Measurement-Based Approach* M. Jonker, U. of Twente, 2019
- *Distributed DDoS Defense - A collaborative Approach at Internet Scale* J.Steinberger, U. of Twente, 2018
- *Improving DNS Security - A measurement-based approach*, R. van Rijswijk-Deij, U. of Twente, 2017
- *Machine Learning and Big Data Methodologies for Network Traffic Monitoring*, D. Giordano, Politecnico di Torino, 2017
- *Machine Learning Algorithms for Structured Decision Making*, R. Houthoof, Ghent University, 2017
- *Flow-based Compromise Detection*, R. Hofstede, University of Twente, 2016
- *Estimating Required Bandwidth using Flow-based measurements*, R. de O. Schmidt, U. of Twente, 2014
- *Optimization and Distribution of Interactive Personalized Services*, P. Leroux, Ghent University, 2012

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#### TEACHING EXPERIENCE

##### University of Twente, The Netherlands

###### Lecturer

Course: Internet Security	<b>2016 -</b>
Course: Cloud Networking	<b>2014 -</b>
Course: Network Security	<b>2011 - 2015</b>
HTHT Minor: Cybersecurity and Cybercrime	<b>2018-</b>
Module: CreaTe Module “Data: From the source to the senses”, Internet Technology	<b>2015 - 2017</b>
Module: Network Systems Module (2016 - 2017)	

<i>Project supervisor</i>	
Course: Design Project	2014 -
Course: Cybercrime & Cybersecurity	2015
<i>Teaching assistant</i>	2008 - 2014
Course: Network Security course: complementary Laboratory for students enrolled in the Kerckhoffs program (Computer Security)	
<i>Teaching assistant</i>	2013 -
Course: Bachelor Referaat	
<b>Ca' Foscari University, Venice, Italy</b>	
<i>Teaching assistant</i>	2003 - 2006
Course: Algorithms, Data Structures and Complexity	
<i>Teaching assistant</i>	2004, 2005
Course: Coding Laboratory	

#### MSC/BSC SUPERVISION

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- Etienne Khan (MSc) *Characterizing the DNS edge infrastructure used for DDoS attacks*, 2019
- Calvin Hendriks (MSc) *Proactive detection of DDoS attacks*, 2019
- Raoul Talud (MSc) *Characterization of Malicious domains based on DNS data*, 2019
- Ramin Yazdani (MSc) *Analysis of internationalized domain names*, 2019
- Metin Acikalin (MSc SIDNLabs) *Classification of recursive resolvers*, 2019
- Ivan Lukman (MSc) *Characterization of domain blacklists*, 2019
- R. Kokkelkoren (MSc NCSC) *Detection of fast flux network in DNS data*, 2019
- Sem Spenkeling (MSc Northwave BV) *Consumer-Deployable Network Intrusion Detection in Public Clouds*, 2018
- Dzul Dzulkarnain (MSc) *IoT Botnets*, 2019
- Iwan Timmer (MSc Northwave BV) *Anomaly Intrusion Detection*, 2018
- Olivier van der Toorn (MSc) *Proactive detection of snowshoe spam in DNS data* 2018
- W. Beukema (MSc, TNO) *Enhancing Network Intrusion Detection through Host Clustering*, 2017
- Kaspar Hageman (MSc) *The Performance of ECC Algorithms in DNSSEC: A Model-based Approach*, October 2015
- Justyna Chromik (MSc) *Booter (black)list* , February 2015
- Erwin Middeloesch (MSc Kerckhoffs Institute and TNO) *Anonymous and hidden communication channels*, February 2015
- Terence Slot (MSc Kerckhoffs Institute) *APT malware by comparing external and internal network traffic*, Jan 2015
- Wouter de Vries (MSc Kerckhoffs Institute) *How asymmetric is the Internet? - A study to support DDoS Mitigation Approaches*, November 2014 (presented at RIPE 69, submitted to TMA 2015)
- Daniel van der Steeg (MSc) *Flow-based DDoS attack detection in Cisco IOS*, August 2014 (accepted for publication at IM 2015)
- Mattijs Jonker (MSc Kerckhoffs Institute) *Flow-based SSH Dictionary Attack Detection: the Effects of Aggregation*, August 2014 (accepted for publication at IM 2015)
- Mark Wierbosch (MSc Kerckhoffs Institute) *It is raining packets*, July 2014
- Luuk Hendriks (MSc) *SSH Compromise Detection using NetFlow and IPFIX*, March 2014
- Dirk Maan (BSc) *Can we trust the Internet Census 2012?*, Feb 2014
- Jarmo van Lentheß (Kerckhoffs Institute) *Combining Multiple Malware Detection Approaches for Achieving Higher Accuracy*, January 2014
- Gijs van den Broek (MSc) *Improving Response Deliverability in DNSSEC*, July 2012
- Ivo Beckers (BSc) *The Distribution of Data Traffic using Flow Data*, January 2012
- Rick Hofstede (MSc) *IPFIX Export for the Ethernet-Layer*, July 2011
- Rick Hofstede (BSc) *Investigation of information sources for network monitoring*, July 2009
- Gert Vlieg (MSc) *Detecting spam machines, a Netflow-data based approach*, February 2009
- Stephan Roolvink (MSc) *Detecting DDoS attacks involving DNS servers, a Netflow-data based approach*, December 2008
- Daan van der Sanden (MSc) *Detecting UDP attacks in high speed networks using packet symmetry with only flow data*, August 2008
- Joris Kinable (BSc) *Detection of network scan attacks using flow data*, June 2008

## JOURNAL EDITOR

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- Area Editor for the ACM SIGCOMM Computer Communications Review (CCR)
- Associate Editor for the Journal of Network and Systems Management (JNSM)
- Associate Editor for the International Journal of Network Management (IJNM)
- Guest Editor for the Special Issue of the International Journal on Network Management (IJNM): *Measure, Detect and Mitigate - Challenges and Trends in Network Security* (G. Dreo Rodosek, A. Sperotto, C. Schmitt, R. Hofstede and A. Dainotti) - scheduled for publication in September 2015
- Guest Editor for the Special Issue of the International Journal on Network Management (IJNM): *Flow-based Approaches in Network Management: Recent Advances and Future Trends* (R. Sadre, A. Sperotto, R. Hofstede and N. Brownlee) - published July 2014

## EVENTS ORGANIZATION

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- Technical Programme Committee Co-Chair for the Passive and Active Measurement Conference 2020, Eugene, Oregon
- General Co-Chair for the Internet Measurements Conference 2019, Amsterdam, The Netherlands
- Co-Chair for the Traffic Monitoring and Analysis 2017 PhD School, June 19-21, Maynooth, Ireland
- Technical Programme Committee for the 7th International Workshop on Traffic Monitoring and Analysis (TMA 2015), April 23-24, 2015, Barcelona
- Co-chair for the 8th International Conference on Autonomous Infrastructure, Management and Security (AIMS 2014), June 30 - July 3 2014, Brno, Czech Republic
- Co-chair for the Ph.D Workshop of the 7th International Conference on Autonomous Infrastructure, Management and Security (AIMS 2013), June 25-28, 2013, Barcelona, Spain
- Technical Programme Committee of the IEEE/IFIP Network Operations and Management Symposium (NOMS 2014)
- Technical Programme Committee for the IFIP/IEEE International Symposium on Integrated Network Management (IM 2013, IM 2015)
- Technical Programme Committee of the Asia-Pacific Network Operations and Management Symposium (APNOMS 2012, APNOMS 2013, APNOMS 2014)
- Technical Programme Committee of the 6th International Conference on Autonomous Infrastructure, Management and Security (AIMS 2012), June 4-8, 2012, University of Luxembourg, Luxembourg
- Technical Programme Committee for the Ph.D Workshop of the 5th International Conference on Autonomous Infrastructure, Management and Security (AIMS 2011), June 13-17, 2011, Nancy, France
- Technical Programme Committee of the 3rd Workshop on the Pervasive Application of Wireless Technologies, September 27, 2011, Enschede, The Netherlands.
- Local organization of 5th International Week on Management of Network and Services, (MANWEEK '09) TelecomItalia Future Centre, Venice, Italy, October 26-30, 2009.
- Local organization of 3rd International Conference on Autonomous Infrastructure, Management and Security (AIMS '09), University of Twente, The Netherlands, June 30 – July 2, 2009.

## REVIEWER

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- IEEE/ACM Transaction on Networking
- Elsevier Computer Networks
- IEEE Communications Magazine
- IEEE Transactions on Network and Service Management
- Journal of Network and Systems Management
- Journal of Internet Services and Applications
- International Workshop on Traffic Monitoring and Analysis (TMA)
- IFIP Networking
- International Conference on Network and Service Management (CNSM)
- IEEE/IFIP Workshop on End-to-End Monitoring Techniques and Services (E2EMON)
- IFIP/IEEE International Conference on Management of Multimedia and Mobile Networks and Services (MMNS)
- IEEE/IFIP Network Operations and Management Symposium (NOMS)
- IFIP/IEEE International Symposium on Integrated Network Management (IM)
- ACM/IEEE International Workshop on Quality of Service (IWQoS)
- COST Traffic Monitoring and Analysis Workshop (TMA)
- Performance and Dependability Symposium (DSN-PDS)