

# Sarah Anne Wassermann

## Personal information

Female  
Born 17<sup>th</sup> April 1993  
Luxembourgish

## Contact

[sarah@wassermann.lu](mailto:sarah@wassermann.lu)  
[www.linkedin.com/in/sarahwassermann](http://www.linkedin.com/in/sarahwassermann)  
+352 691 25 17 09

## Home address

81, allée Léopold Goebel  
L-1635 Luxembourg  
Grand Duchy of  
Luxembourg

## Research in network measurements

**4 international internships in France, Austria, and the United States**

**6 publications in network measurement topics**

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## Education

### MSc. Computer Science

Université de Liège (ULg) – Belgium

- Expected graduation in **September 2017**
- Specialising in **computer systems and networks**
- Master's thesis entitled "**Anycast-based DNS in Mobile Networks**", supervised by Prof. Fabián Bustamante (Northwestern University) and Prof. Benoit Donnet (University of Liège); with **high honours**
- **Conducting research** under the supervision of Dr. Pedro Casas, Prof. Fabián Bustamante, and Prof. Benoit Donnet in the field of **Internet measurements**. **Topics:** Internet path dynamics and performance, machine learning for networking, anycast in cellular networks, malware detection in smartphones
- Active as a student representative during my whole Master's studies

### BSc. Computer Science

Université de Liège (ULg) – Belgium

- Ranked among **Top 3 students** every year: 2 out of 50 1<sup>st</sup> year, 1 out of 10 2<sup>nd</sup> year, and 3 out of 9 3<sup>rd</sup> year
- Active as a student representative during the last two years of my Bachelor's degree
- Graduated with **honours** in **June 2015**

### General Certificate of Secondary Education

Lycée Michel Rodange – Luxembourg

- Main subject areas: mathematics and informatics
- Graduated with grade **excellent** in **July 2012**

### Online courses

Coursera

- Image and video processing: From Mars to Hollywood with a stop at the hospital (score: **100%**); **March 2014**
- Machine Learning (score: **100%**); **September 2014**
- An Introduction to Interactive Programming in Python (score: **99.6%**); **January 2014**
- Einführung in Computer Vision (score: **65.5%**); **February 2014**

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## Awards and honours

- **Travel grants** to attend ACM CoNEXT 2015, TMA PhD School 2016, IEEE LCN 2016, ACM CoNEXT 2016, ACM SIGCOMM 2017 (N2Women Young Researcher Fellowship and SIGCOMM travel grant)
- **Pisart Grant** for pedagogical support; fall 2014

- **Best student prize** for graduating as the best high-school student of my class (grade: **excellent**, ranked in **Top 1.3% of the Grand Duchy of Luxembourg**); July 2012
- **Best student prize** for having the highest GPA of my class in all the academic years from 2005 to 2009

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## Scientific publications

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### Journal papers

- [1] ***“Unveiling Network and Service Performance Degradation in the Wild with mPlane”***  
P. Casas, P. Fiadino, S. Wassermann, S. Traverso, A. D'Alconzo, E. Tego, F. Matera, M. Mellia  
in IEEE Communications Magazine, Network Testing Series, vol. 54 (3), pp. 71-79, 2016.

### Workshop papers

- [2] ***“On the Analysis of Internet Paths with DisNETPerf, a Distributed Paths Performance Analyzer”***,  
S. Wassermann, P. Casas, B. Donnet, G. Leduc, M. Mellia  
in Proc. 10th IEEE Workshop on Network Measurements (WNM), Dubai, United Arab Emirates, 2016.
- [3] ***“NETPerfTrace – Predicting Internet Path Dynamics and Performance with Machine Learning”***,  
S. Wassermann, P. Casas, T. Cuvelier, B. Donnet  
in Proceedings of ACM SIGCOMM 2017 Workshop on Big Data Analytics and Machine Learning for Data Communication (Big-DAMA), Los Angeles (CA), USA, 2017.

### Extended abstracts

- [4] ***“Towards DisNETPerf: a Distributed Internet Paths Performance Analyzer”***  
S. Wassermann, P. Casas, B. Donnet  
in Proceedings of the ACM CoNEXT Student Workshop, Heidelberg, Germany, 2015.
- [5] ***“Machine Learning based Prediction of Internet Path Dynamics”***  
S. Wassermann, P. Casas, B. Donnet  
in Proceedings of the ACM CoNEXT Student Workshop, Irvine (CA), United States, 2016.

### Demo sessions

- [6] ***“Reverse Traceroute with DisNETPerf, a Distributed Internet Paths Performance Analyzer”***  
S. Wassermann, P. Casas  
in Proceedings of Demonstrations of the 41th Annual IEEE Conference on Local Computer Networks (LCN-Demos 2016), Dubai, United Arab Emirates, 2016.

### Technical reports

- [7] ***“Predicting Internet Path Dynamics and Performance with Machine Learning”***  
S. Wassermann, P. Casas, T. Cuvelier, B. Donnet  
AIT-Big-DAMA Tech. Rep. A3215, available online at <https://bigdama.ait.ac.at/publications/>, 2017.

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## Research experience

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### Junior Investigator

### Austrian Institute of Technology (AIT) – Austria

- Research internship in the context of the ICT15-129 project Big-DAMA under the supervision of Dr. Pedro Casas; **March 2017**
- The subject of this research stay was “**Mobile Malware Detection using Machine Learning and Big-Data Analytics**”. I worked in the **analysis of a large-scale dataset of smartphone measurements**, with the aim of automatically discovering malware activity. I developed different machine-learning based approaches for both **supervised and unsupervised detection of malware applications**, using the scikit-learn machine-learning library. I also explored the usage of big-data analytics and platforms to perform the analysis, using Apache Hive, Apache Spark, and the machine-learning library MLlib for Spark.

### Visiting Pre-Doctoral Fellow

### Northwestern University (NU) – United States

- Research stay in the Aqualab group under the supervision of Prof. Fabián Bustamante and Dr. John Rula; **July – September 2016**
- My research topic was entitled “**Analysis of Anycast-based Content Distribution in Cellular Networks**”. I studied the **performance of anycast routing for cellular clients**. I conducted and analysed the **measurements from distributed mobile vantage points to a live anycast CDN**, measuring the latencies and routes to server deployments, and investigated the causes of poor performance for cellular clients.

### Research intern

### Forschungszentrum Telekommunikation Wien (FTW) – Austria

- Research internship in the context of the of the FP7 ICT European Research Project mPlane under the supervision of Dr. Pedro Casas; **July – September 2015**
- The subject of this internship was “**Tracking the Performance of CDN Servers-to-Customers Internet Paths with Distributed Active Measurements**”. I worked in the field of **geo- and topology-based location of active probes** – devices capable of launching active measurements – **at the Internet scale**, relying on the well-known **RIPE Atlas** distributed active measurements platform. I designed and developed **DisNETPerf**, an Internet-scale measurement framework to track the performance of Internet paths, relying on distributed probes’ location and active measurements. In a nutshell, DisNETPerf can measure path performance using standard traceroute-like measurements, but can do so for paths connecting arbitrarily selected nodes. I developed different techniques to find the optimal probe – in terms of network topology and path latency – closest to a desired server, which is then used to masquerade this server and to collect active network-path measurements. DisNETPerf thus allows users to accurately monitor servers through active measurements, even if they do not have access to these servers. An in-depth description and evaluation of my tool can be found in [2, 4, 6].

### Summer intern

### Laboratoire d’Informatique de Paris 6 (LIP6) – France

- Internship at the Laboratory of Information, Networking and Communication Sciences (LINCS) under the supervision of Prof. Timur Friedman, Dr. Marc-Olivier Buob, and Dr. Jordan Augé; **July 2014**
- I was involved in the **Paris Traceroute** and **libparistraceroute** projects. I developed **Paris Ping**, a generic ping tool based on the libparistraceroute library which can handle IPv4, IPv6, and TCP, UDP, ICMP probes. Contrary to the standard ping tool, the flow IDs of each sent packet remain constant in order to avoid flow-based load balancing, which enhances the accuracy of the latency measurements. In addition to the implementation of Paris Ping, I also extended the libparistraceroute library.

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## Open-source projects

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### DisNETPerf

I designed and implemented DisNETPerf – a Distributed Internet Paths Performance Analyzer – during my internship at FTW, with the collaboration of Dr. Pedro Casas and Dr. Pierdomenico Fiadino.

DisNETPerf is a tool that allows one to **locate the closest RIPE Atlas box** (in terms of minimum RTT) to a given IP address. Once the closest RIPE Atlas box has been located, DisNETPerf permits to **launch traceroutes** from this box to a destination IP address provided by the user. More details about the tool and how the closest probe is actually chosen are explained in [2, 4, 6].

DisNETPerf is freely available on GitHub: <https://github.com/SAWassermann/DisNETPerf>

### NETPerfTrace

I developed NETPerfTrace — an Internet Path Tracking System — while working on a research project about the prediction of Internet path dynamics and performance, in collaboration with Dr. Pedro Casas.

NETPerfTrace is a tool capable of **forecasting path changes and path latency variations**. NETPerfTrace aims at predicting **three metrics**:

- the residual life time of a route (i.e. the remaining life time of the route before it actually changes)
- the number of route changes in the next time window
- the average RTT of the next traceroute sample

The overall idea of this tool and preliminary results are presented in [3, 5, 7].

NETPerfTrace is freely available on GitHub: <https://github.com/SAWassermann/NETPerfTrace>

### libparistraceroute

I contributed to the libparistraceroute project (which includes the well-known Paris Traceroute) during my internship at LIP6.

My main contribution was the development of **Paris Ping**. I also extended the libparistraceroute library itself by adding probe matching. More precisely, I implemented functions to check whether a probe corresponds to the reply to a given probe (for the IPv4/6, ICMPv4/6, and TCP protocols).

libparistraceroute is freely available on GitHub: <https://github.com/libparistraceroute/libparistraceroute>

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## Editorial boards

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### Reviewer

### IEEE Communication Letters

I served as reviewer for IEEE Communications Letters in **September 2016**

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## Teaching activities

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### Undergraduate teaching assistant

### Université de Liège (ULg) – Belgium

I was hired as an undergraduate teaching assistant to supervise and help students during the exercise sessions for the course **Introduction to Computer Programming** (1<sup>st</sup> year BSc. course in Computer Science, taught by Prof. Benoit Donnet); **fall 2013 and 2014**

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## Work experience

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### Active member

### IEEE Student Branch Liège

I design flyers and posters for the events organised by the student branch. I also actively participate in the organisation of conferences. I have been the main organiser for the talk entitled “*Practical Internet-of-Things: the reality between people, process, data and things*” given by Emmanuel Tychon (Cisco) at the University of Liège in November 2016. I participated in IEEEExtreme 8.0 as a competitor; **since September 2013**

### IT coordinator

### Board of European Students of Technology (BEST)

I was responsible for redesigning and reworking the website of the local BEST group of the University of Liège; **2013 – 2015**

### Event organiser

### Board of European Students of Technology (BEST)

I was in charge of organising events in collaboration with the IEEE student branch at the University of Liège. I helped organising the conference about photonic quantum computers given by Dr. André Hautot in February 2014; **2013 – 2015**

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## Technical skills

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<b>Programming languages</b>	Python, Java, C, C++
<b>Data analytics</b>	scikit-learn, Weka, Hive, Spark
<b>Query languages</b>	SQL
<b>Web publishing</b>	HTML, CSS
<b>Software development kits</b>	Android SDK (Java)
<b>Operating systems</b>	Microsoft Windows, Linux
<b>Development environments</b>	Microsoft Visual Studio (Ultimate), PyCharm, IntelliJ IDEA, MathWorks MATLAB
<b>Other software</b>	Adobe Photoshop, Maxon Cinema 4D

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## Languages

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<b>Luxembourgish</b>	native proficiency
<b>French</b>	bilingual proficiency
<b>German</b>	full professional proficiency
<b>English</b>	full professional proficiency

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## Personality and interests

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### Personality

hard worker, results-driven, detail-minded, self-confident

### Interests

Travelling, reading (mostly novels), photography, listening to music (particularly electronica), playing the piano, graphic design, video games (especially action-adventure and strategy games)

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## References

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**Dr. Pedro Casas**

**Austrian Institute of Technology (AIT) – Austria**

- Email: [pedro.casas@ait.ac.at](mailto:pedro.casas@ait.ac.at)
- Homepage: <http://pcasas.info/>

**Prof. Dr. Fabián E. Bustamante**

**Northwestern University (NU) – United States**

- Email: [fabianb@cs.northwestern.edu](mailto:fabianb@cs.northwestern.edu)
- Homepage: <http://www.cs.northwestern.edu/~fabianb/>

**Prof. Dr. Benoit Donnet**

**Université de Liège (ULg) – Belgium**

- Email: [benoit.donnet@ulg.ac.be](mailto:benoit.donnet@ulg.ac.be)
- Homepage: <http://www.montefiore.ulg.ac.be/personnel.php?op=detail&id=1077>

**Prof. Dr. Timur Friedman**

**Laboratoire d'Informatique de Paris 6 (LIP6) – France**

- Email: [timur.friedman@upmc.fr](mailto:timur.friedman@upmc.fr)
- Homepage: <http://www-npa.lip6.fr/~timur/>