Rüdiger Birkner

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Education

Jul 2016–Sep 2021 **PhD Student**, *Networked Systems Group at ETH*, Zürich, CH.
Advised by Prof. Laurent Vanbever and Prof. Martin Vechev
Dissertation: *Improving Network Understanding*

Sep 2014–Jun 2016 **MSc in Information Technology and Electrical Engineering**, *ETH*, Zürich, CH.
Specialization: Computers and Networks
Master thesis (advised by Prof. Laurent Vanbever and Prof. Nick Feamster):
On the Correctness of Inter-Domain SDN Deployments

Sep 2013–Feb 2014 **UNITECH Exchange**, *Loughborough University*, Loughborough, UK.
Extended my engineering studies through a focus on management and business.

Sep 2010–Aug 2014 **BSc in Information Technology and Electrical Engineering**, *ETH*, Zürich, CH.

Experience

Professional

Jul 2016–Oct 2021 **Research Assistant**, *Networked Systems Group at ETH*, Zürich, CH.

- Worked on methods to extract high-level insights from low-level network data and making these insights available to operators in intuitive ways. Published in [1, 2].
- Investigated implications of programmable data-planes in combination with traditional BGP routing. Published in [3].
- Designed an automated testing framework for network validation tools and found over 60 bugs. Published in [4].
- Advised and worked with students on research projects, one of which lead to a paper on safe network reconfigurations [5].

Jun 2019–Sep 2019 **Software Engineering Intern**, *Google*, Sunnyvale, CA, US.

- Research on methods to infer network performance in the Network Infrastructure group.

Technologies used: Python, SQL

Nov 2015–Apr 2016 **Visiting Research Student**, *Princeton University*, Princeton, US.

- Contributed to the ongoing development of the iSDX platform.
- Explored new methods of network monitoring by leveraging advances in programmable data-planes and stream processors. Published in [6].

Technologies used: Python, OpenFlow, P4

Feb 2015–Nov 2015 **Research Assistant**, *Networked Systems Group at ETH*, Zürich, CH.

- Redesigned the Software-Defined Internet Exchange (SDX) in collaboration with Princeton University. Published in [7, 8].
- Reduced the number of forwarding entries required by two orders of magnitude compared to the original design by using bitmask matching enabled through OpenFlow 1.3.
- Helped adapt the system for hardware switches using Broadcom's OF-DPA 2.0 software.

Technologies used: Python, OpenFlow, Ryu, MongoDB

Feb 2015–Nov 2015 **Research Assistant**, *Integrated Systems Lab at ETH*, Zürich, CH.

- Developed and maintained an Android app to monitor vital signs acquired by a wearable, medical device in real-time.
- Carried out tests in collaboration with the university hospital of Zürich.

Technologies used: Java, Bluetooth Low Energy

Feb 2014–Jul 2014 **Business Development Intern**, *Evonik Industries*, Hsinchu, TW.

- Evaluated materials for applications in the electronics industry.
- Supported creative idea generation processes through analysis of IP and relevant markets.

Sep 2011–Jun 2013 **Teaching Assistant**, *ETH*, Zürich, CH.

- Advised students during computer engineering labs.
- Led tutorial sessions for first year students in digital circuits.

Volunteer

Oct 2016–Apr 2019 **Financial Officer & Council Member**, *UNITECH Alumni Association*, Zürich, CH.

Sep 2015–Present **Elected Member of the Synod**, *Reformierte Kirche des Kanton Zürich*, Zürich, CH.

Awards and Honors

2021 **Applied Networking Research Prize**, *IETF/IRTF*.

2017 **SOSR'17 Best Paper Award**, *ACM*.

2016 **NSDI'16 Community Award**, *USENIX Association*.

2016 **Winner of the SDN Throwdown - Hackathon**, *Comcast and Juniper Networks*.

2015 **Master Thesis Grant**, *Zeno Karl Schindler Foundation*.

Publications

[1] **Rüdiger Birkner**, Dana Drachsler-Cohen, Laurent Vanbever, and Martin Vechev. Net2Text: Query-Guided Summarization of Network Forwarding Behaviors. In *USENIX NSDI*, 2018.

[2] **Rüdiger Birkner**, Dana Drachsler-Cohen, Laurent Vanbever, and Martin Vechev. Config2Spec: Mining Network Specifications from Network Configurations. In *USENIX NSDI*, 2020.

[3] **Rüdiger Birkner**, Arpit Gupta, Nick Feamster, and Laurent Vanbever. SDX-Based Flexibility or Internet Correctness? Pick Two! In *ACM SOSR*, 2017.

[4] **Rüdiger Birkner***, Tobias Brodmann*, Petar Tsankov, Laurent Vanbever, and Martin Vechev. Metha: Network Verifiers Need To Be Correct Too! In *USENIX NSDI*, 2021.
*These authors contributed equally to this work.

[5] Tibor Schneider, **Rüdiger Birkner**, and Laurent Vanbever. Snowcap: Synthesizing Network-Wide Configuration Updates. In *ACM SIGCOMM*, 2021.

[6] Arpit Gupta, **Rüdiger Birkner**, Marco Canini, Nick Feamster, Chris Mac-Stoker, and Walter Willinger. Network Monitoring is a Streaming Analytics Problem. In *ACM Hotnets*, 2016.

[7] Arpit Gupta, Robert MacDavid, **Rüdiger Birkner**, Marco Canini, Nick Feamster, Jennifer Rexford, and Laurent Vanbever. iSDX: An Industrial-Scale Software Defined Internet Exchange Point. In *USENIX NSDI*, 2016.

[8] Robert MacDavid, **Rüdiger Birkner**, Ori Rottenstreich, Arpit Gupta, Nick Feamster, and Jennifer Rexford. Concise Encoding of Flow Attributes in SDN Switches. In *ACM SOSR*, 2017.