Kyle Simpson

Curriculum Vitæ

Sir Alwyn Williams Building
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University Education

2017–2022 **PhD Degree in Computing Science**, *University of Glasgow*, Scotland
Supervisor: Prof. Dimitrios P. Pezaros

Thesis: *Online Learning on the Programmable Dataplane*

Tutor (see *Teaching* section)

Research Community integration (see *Research Community Activities* section)

2012–2017 **MSci Degree in Computing Science**, *University of Glasgow*, Scotland

Grade: **1st Class Hons** (highest grade). Equivalent to combined BSc Hons and MSc.

Class prize—highest overall grade in years 3–5.

MSci Thesis: *Graph Models and Maximum Common Subgraph for Character Analysis*

BSc Thesis: *Onion-Routed Communication Over WebRTC*

Professional Experience

since 2021 **Research Associate**, *University of Glasgow*, Scotland
Researcher on the "*TruSDEd: Trustworthy, Software-Defined Cyberattack Detection and Mitigation at the Network Edge*" project, supervised by Prof. Dimitrios P. Pezaros.

2019–2020 **Affiliate**, *Lawrence Berkeley National Laboratory*, USA (CA)
I led investigation into flow classification on high-speed networks using state-of-the-art machine learning models and programmable network hardware. Work presented at IEEE GLOBECOM 2020.

2019 **Research Intern**, *ESnet, Lawrence Berkeley National Laboratory*, USA (CA), 3 months
I undertook the design, implementation, and testing of software written in Go for high-throughput stateful traffic analysis in the future design of a large-scale WAN. This included modification of programmable switch firmware, deep analysis of the network stack, and close integration with operations staff. Presented at IMC 2019.

2016 **Research Intern**, *University of Glasgow*, Scotland, 2 months
Problem model design, implementation and optimisation in Constraint and Integer Programming paradigms (Choco3 and Gurobi solvers), working with Prof. David Manlove and Dr. Patrick Prosser.

Skills

- **Languages**: **Rust**, **C**, **P4 (Tofino)**, Go, Javascript, Typescript, Python, Java, C++, SQL, and C#.
- **Tech**: Networked and distributed applications, embedded SmartNIC programming, eBPF, XDP, DPDK, SDN control and data plane design, and Linux testbed administration.
- **Presentation**: Years of **technical and scientific writing** experience (publications, OSS documentation, blogs), data analysis, oral presentation.
- **Critical analysis**: Scientific review and shadow programme committee experience for high-impact venues, e.g., ACM EuroSys, IEEE INFOCOM, IEEE TNSM.

Open-source Involvement

since 2020 **Songbird**, *Rust*
Standalone VOIP driver for Discord. I am responsible for its architecture, initial implementation, and maintenance. This work spawned the stream-catcher minimal-locking bytestream cache.

2018–2021 **Serenity**, *Rust*
Discord bot client. I primarily maintained the voice system.

Contributions
I have contributed bug fixes and improvements to the Rust compiler, Open vSwitch, Symphonia, redbpf, xsk-rs, twilight-rs, and amethyst-rs.

Awards and Scholarships

2022 **SICSA PhD Conference 2022 – Best Research Paper Award**
"Revisiting the Classics: Online RL in the Programmable Dataplane" [1]

2022 **NOMS 2022 Student Travel Grant**, *$500*

2020 **CoNEXT 2020 Registration Grant**, *$80*

2017 **EPSRC PhD Scholarship**, *approx. £63,500*
Engineering and Physical Sciences Research Council (EPSRC) funded PhD (3.5 years) at the University of Glasgow.

2015–2017 **Class Prizes**, *£100 ea*
Awarded to the student with the highest GPA in **Level 3** (18.8/22.0), **Hons** (20.7/22.0), and **MSci** (20.3/22.0)

Research Community Activities

Program Committees & Reviewing

- **Shadow Program Committee**: ACM EuroSys 2021.
- **Chairing**: Session chair (IEEE GLOBECOM 2020, NetAI).
- **External reviewer for conferences**: IEEE INFOCOM (International Conference on Computer Communications), IFIP Networking, IFIP/IEEE IM (International Symposium on Integrated Network Management), IEEE GLOBECOM (Global Communications Conference), and IEEE ICC (International Conference on Communications).
- **Reviewer for journals**: IEEE TNSM (Transactions on Network and Service Management), IEEE TNSE (Transactions on Network Science and Engineering), IEEE JSAC (Journal on Selected Areas in Communication), IEEE Communications Letters, and Elsevier Computer Networks.

Research Networks

- **Professional societies**: Student Member of the ACM (SIGCOMM), and the IEEE (ComSoc and Young Professionals).
- **Community networks**: Member of the UK Many-core Research, Innovation and Opportunities Network (MaRIONet), the Networked Systems Research Laboratory (Netlab) at the University of Glasgow, and regular participant of the SCOttish Networking Event (SCONE).
- **Organisation**: Chaired and organised a Netlab-internal reading group seminar series.

Publications

2022 [1] **Kyle A. Simpson** and Dimitrios P. Pezaros. "Revisiting the Classics: Online RL in the Programmable Dataplane". In: *2022 IEEE/IFIP Network Operations and Management Symposium, NOMS 2022, Budapest, Hungary, April 25-29, 2022*. CORE 2021 Ranking: B, **SICSA PhD Conference 2022 Best Paper**. IEEE, 2022, pp. 1–10.

2021 [2] **Kyle A. Simpson** and Dimitrios P. Pezaros. "Poster: Online RL in the programmable dataplane with OPaL". In: *CoNEXT '21: The 17th International Conference on emerging Networking EXperiments and Technologies, Virtual Event, Munich, Germany, December 7–10, 2021*. CORE 2021 **Ranking: A**. ACM, 2021, pp. 471–472.

2020 [3] **Kyle A. Simpson**, Richard Cziva, and Dimitrios P. Pezaros. "Seiðr: Dataplane Assisted Flow Classification Using ML". In: *IEEE Global Commu-*

nications Conference, GLOBECOM 2020, Virtual Event, Taiwan, December 7–11, 2020. CORE 2020 Ranking: B. IEEE, 2020, pp. 1–6.

[4] **Kyle A. Simpson**, Simon Rogers, and Dimitrios P. Pezaros. "Per-Host DDoS Mitigation by Direct-Control Reinforcement Learning". In: *IEEE Trans. Netw. Serv. Manag.* 17.1 (2020). SJR **Ranking: Q1**, pp. 103–117.

2017 [5] Ciaran McCreesh, Patrick Prosser, **Kyle Simpson**, and James Trimble. "On Maximum Weight Clique Algorithms, and How They Are Evaluated". In: *Principles and Practice of Constraint Programming - 23rd International Conference, CP 2017, Melbourne, VIC, Australia, August 28 - September 1, 2017, Proceedings*. CORE 2017 **Ranking: A**. 2017, pp. 206–225.

Talks and Presentations

06/2022 **Talk**, *PETRAS Academic Community Conference*, Goodenough College, London, United Kingdom
Title: TruSDEd: Trustworthy, Software-Defined Cyberattack Detection and Mitigation at the Network Edge

12/2021 **Poster**, *The 17th International Conference on emerging Networking EXperiments and Technologies*, Munich, Germany (Virtual)
Title: Online RL in the Programmable Dataplane with OPaL

9/2021 **Talk**, *SICSA Conference 2021*, Virtual
Title: PhD Skills Workshop Session: Adapting Your Project to Work During COVID

6/2021 **Talk**, *NGN Webinar*, Virtual Seminar Series
Title: Revisiting the Classics: Online RL in the Programmable Dataplane

12/2020 **Talk**, *Fifth Annual UK Systems Research Challenges Workshop*, Virtual Seminar Series
Title: Towards In-Switch Reinforcement Learning

11/2020 **Talk**, *Systems Section Talk*, Sir Alwyn Williams Building, University of Glasgow, Scotland
Title: Seiðr—Dataplane Assisted Flow Classification Using ML

11/2019 **Talk**, *RSC Internship Workshop*, Sir Alwyn Williams Building, University of Glasgow, Scotland
Title: Internship Experience and Advice

10/2019 **Poster**, *ACM IMC 2019 (Internet Measurement Conference)*, KIT Royal Tropical Institute, Amsterdam, The Netherlands
Title: Real-time Performance Analysis of High-Speed, International Science Network Flows

08/2019 **Talk**, Shyh Wang Hall, Lawrence Berkeley National Laboratory, USA (CA)
Title: ESnet6 HighTouch Collector: Overview and Future

08/2019 **Poster**, Shyh Wang Hall, Lawrence Berkeley National Laboratory, USA (CA)
Title: ESnet6 HighTouch Services: TCP at the Nanosecond Scale

02/2019 **Talk**, *Systems Section Talk*, Sir Alwyn Williams Building, University of Glasgow, Scotland
Title: Improved Direct-Control Reinforcement Learning for DDoS Prevention

09/2018 **Talk**, *SCONE 20 (SCOttish Networking Event)*, Informatics Forum, University of Edinburgh, Scotland
Title: Improving Direct-Control Reinforcement Learning for Network Intrusion Prevention

04/2018 **Talk**, *Algorithmics Group Talk*, Sir Alwyn Williams Building, University of Glasgow, Scotland
Title: Reinforcement Learning in Network Defence/Control

Teaching

As a PhD Student at the University of Glasgow

2020–2021
- Teaching Assistant: *MSc Summer Project Support*.
- Teaching & Marking Assistant: *Data Fundamentals*, undergraduate course (Level H/M).
- Teaching & Marking Assistant: *Networked Systems*, undergraduate course (Level H/M).

2019–2020
- Teaching Assistant: *Data Fundamentals*, undergraduate course (Level H/M).
- Teaching Assistant: *Systems Programming*, undergraduate course (Level H/M).
- Teaching Assistant: *Machine Learning*, undergraduate course (Level H/M).
- Teaching Assistant: *Machine Learning for Data Scientists*, postgraduate course (Level M).
- Teaching Assistant: *Operating Systems*, undergraduate course (Level H/M).
- Teaching Assistant: *Networked Systems*, undergraduate course (Level H/M).
- Teaching Assistant: *Cybersecurity Fundamentals*, postgraduate course (Level M).
- Teaching Assistant: *Programming Languages*, undergraduate course (Level H/M).

2018–2019
- Teaching Assistant: *Quantum Technology and Cryptography Summer School*, introductory lessons for high-school level students.
- Teaching Assistant: *Data Fundamentals*, undergraduate course (Level H/M).
- Teaching Assistant: *Networks and Operating Systems Essentials*, undergraduate course.
- Teaching Assistant: *Cybersecurity Fundamentals*, postgraduate course (Level M).
- Teaching Assistant: *Programming Languages*, undergraduate course (Level H/M).

2017–2018
- Teaching Assistant: *Advanced Programming (IT)*, postgraduate course (Level M).

As an MSci Student at the University of Glasgow

2016–2017
- Teaching Assistant: *Programming Languages*, undergraduate course (Level H/M).
- Teaching Assistant: *Advanced Programming*, undergraduate course (Level H/M).
- Teaching Assistant: *Advanced Programming (IT)*, postgraduate course (Level M).
- Teaching Assistant: *Networked Systems*, undergraduate course (Level H/M).