Lukas Burgholzer

Curriculum Vitae

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Experience

07/2023–present **Postdoctoral Researcher**, *Technical University of Munich*, Germany.
Chair for Design Automation.

2019–2023 **University Assistant**, *Johannes Kepler University Linz*, Austria.
LIT Secure and Correct Systems Lab. Institute for Integrated Circuits.

2018–2019 **Graduate Research Associate**, *MathConsult GmbH*, Linz, Austria.

Education

2019–2023 **PhD Studies in Computer Science**, *Johannes Kepler University Linz*, Austria.
Supervisor: Univ.-Prof. Dr. Robert Wille (Institute for Integrated Circuits)

2016–2019 **Bachelor's Degree in Computer Science**, *Johannes Kepler University Linz*, Austria.

2017–2018 **Master's Degree in Mathematics**, *Johannes Kepler University Linz*, Austria.

2013–2016 **Bachelor's Degree in Mathematics**, *Johannes Kepler University Linz*, Austria.

Skills

Languages German (native), English (fluent)

Programming Modern C++, Python, GitHub, CI/CD, CMake

Research LaTeX, tikz, Zotero, MS Office

Accomplishments

2022–2023 Invited as a mentor to the NYUAD Int'l Hackathon for Social Good in the Arab World in 2022 and 2023

2022 "JKU Young Researcher's Award" from Johannes Kepler University Linz

2021 Accepted into the "IBM Qiskit Advocate" program as recognition of my contributions to the community

2019–2023 Several contributions to open-source projects (such as Qiskit, TKET, ...)

2019–2020 Invitation to the IBM Qiskit Camps in Tokio (2019) and New York (2020)

2019–2021 Several top placements at various quantum computing challenges

Research and Publications

In my work, I am developing software for the computers of the future so that they are as easy to use as the computers we have today. In particular, I develop design automation tools and software for quantum computing—from core methods and data structures to the classical simulation, compilation, or verification of quantum circuits and beyond. My research takes an important step towards avoiding a situation where we have powerful quantum computers, but no means to design suitable applications for them.
For a full list of publications, see `https://www.cda.cit.tum.de/team/burgholzer/`.

Open-Source Software

Everything developed as part of my research is publicly available on GitHub (`https://github.com/cda-tum`) as part of the *Munich Quantum Toolkit (MQT)*. Tools are generally implemented in C++ to be as performant as possible, but additionally offer push-button solutions via Python bindings to be as accessible as possible at the same time. All modern versions of Python are supported and pre-built binaries for all major platforms are available on PyPI. Tools natively integrate with IBM Qiskit, are actively maintained and well documented.
For a full list of contributions, see `https://github.com/burgholzer`.

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[9] Lukas Burgholzer and Robert Wille, "QCEC: A JKQ tool for quantum circuit equivalence checking," *Software Impacts*, 2021.

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[13] Lukas Burgholzer, Alexander Ploier, and Robert Wille, "Exploiting arbitrary paths for the simulation of quantum circuits with decision diagrams," in *Design, Automation and Test in Europe*, 2022.

[14] Lukas Burgholzer and Robert Wille, "Exploiting reversible computing for verification: Potential, possible paths, and consequences," in *Asia and South Pacific Design Automation Conf.*, 2023.

[15] Tom Peham, Lukas Burgholzer, and Robert Wille, "Equivalence checking paradigms in quantum circuit design: A case study," in *Design Automation Conf.*, 2022.

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