

# Accelerating the Development of Quantum Computers through Automation

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Quantum computation promises to revolutionize physics research and our understanding of nature. However, the reliability of qubits, the basic building blocks of quantum computers, poses a significant challenge. Millions of physical qubits are required in quantum processing units (QPUs) to ensure robust and accurate computation. Presently, typical QPUs have fewer than a hundred qubits and are hindered by tedious characterization and tune-up processes that rely on manual intervention. This slow development pace impedes progress in both QPU scalability and quantum computing applications.

To expedite QPU development, we require innovative tools and an automated approach. Quantum EDGE [1], a software platform developed by QuantroIOx [2] streamlines QPU bring-up, characterization and tune-up, Figure 1, through automation, providing deep insights into qubit parameters, enhancing chip fabrication and characterization efficiency, and accelerating qubit advancements in academia and industry.

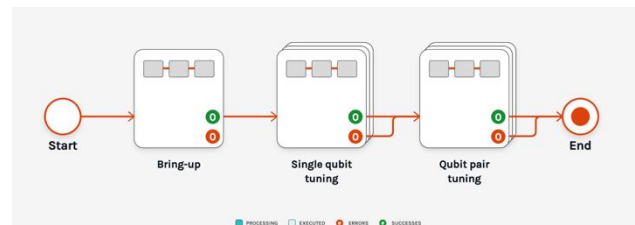
In this talk we show the latest results from Quantum EDGE software on transmons with and without the flux tuning, with fixed and tunable coupling. The qubits are controlled and measured through Quantum EDGE that seamlessly integrates control electronics from Qblox [3], Quantum Machines [4], and Zurich Instruments [5], allowing users to focus on QPU development. We share the latest results on

a number of QPU device architectures, that of QuantWare [6], Rigetti Novera QPU [7] and more, demonstrating a two orders of magnitude improvement in QPU characterization speed, CPHASE 2q gate automation across qubit pairs.

## References

- [1] <https://quantrolox.com/quantum-edge/>
- [2] <https://quantrolox.com/>
- [3] <https://www.qblox.com/>
- [4] <https://www.quantum-machines.co/>
- [5] <https://www.zhinst.com/ch/en>
- [6] <https://www.quantware.com/>
- [7] <https://www.rigetti.com/novera>

## Figures



**Figure 1:** Insert caption to place caption below figure (Century Gothic 10)