

# Why Quantum Computers need Classical Instrumentation

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## **Kurzfassung:**

Building a useful quantum computer is one of the most demanding challenges scientist and engineers can face. Zurich Instruments mission is to support this endeavor by providing the instrumentation to link the analog quantum device containing the quantum bits with the digital instruction sets. We present the first commercial solution for control and readout of up to 100 qubits. The modular concept provides a natural scaling dependent on the needs of various qubit designs and technologies. Based on our Lock-In technology and our expertise in signal processing we developed three devices tailored for Quantum applications and tested them with leading researchers. The HDAWG Arbitrary Waveform Generator to provide the control pulses, the UHFQA Quantum Analyzer to readout the Quantum states with best SNR thanks to our unique adaptive filters. And the PQSC, Programmable Quantum system controller which ensures the synchronization of all channels with a skew  $< 200\text{ps}$ , fast gate operation and real-time algorithm execution.