

# Google achieves new achievements in quantum computing with the 53-qubit Sycamore chip

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The supreme quantum advantage describes the expected ability of quantum computers to perform complex calculations, too difficult for even the most sophisticated machines. Google claims that its chip, called Sycamore, can successfully perform such a calculation.



This operation involves finding patterns (patterns) at random numbers generated by the processor's own qubits. Sycamore produces a set of accurate results in about 3 minutes 20 seconds. Google claims the same task will take more than 10,000 years to complete on the world's largest supercomputer, the Summit 200 petaflop system operated by the US Department of Energy.

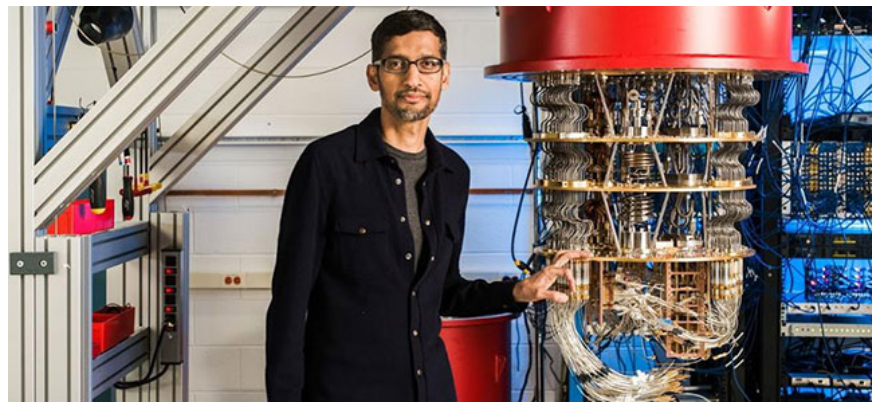
An article (accidentally leaked last month) has received mixed reviews in the academic community. The researchers told the New York Times that they compared this achievement to the first successful flight made by the Wright brothers in 1903. But scientists at IBM Corp, where developing its own quantum chip, questioned this 'giant's breakthrough claim.

Experts argue in a blog post that, in fact, the calculations performed by Sycamore can be solved on a traditional computer. They cited an IBM analysis showing that Summit could theoretically handle the task, if provided with sufficient storage hardware. The researchers detailed the following: 'We argue that the ideal simulation of the same task can be performed on a traditional system in 2.5 days and with much greater accuracy. '.

Other players in the quantum computing market welcomed this news with optimism, but with some caution. Michael Biercuk, CEO of Q-CTRL Pty, a quantum software startup, backed by Sequoia, said: 'This achievement, if sustained under strict supervision and strict compliance. , will be a landmark event ' . Rich Uhlig, head of Intel Labs, emphasized that the commercial potential of quantum computers is still quite remote, but nonetheless congratulates Google for this news.

Moreover, according to Constname Research Inc analyst Holger Mueller, this is only the first step.

'Although being a pioneer is a rewarding effort for the efforts and investment costs that Google has spent, however, this is not very important for the application of quantum computing. It was the first gateway this technology had to overcome. Now it is essential to reduce complexity, total cost of ownership, and make the next generation applications powered by quantum energy coexist with traditional applications. ' .



Building a chip capable of surpassing supercomputers is not easy. Researchers at Google Labs based in Santa Barbara, California, where Sycamore was created, must develop a new, more reliable qubit design based on superconducting metals to avoid computational errors. .

John Martinis and Sergio Boixo, two heads of Google's quantum computing research department, explained: 'We achieved this performance by using a new type of control knob that is able to interrupt interactions between nearby qubits. This greatly reduces errors in such a multi-connected qubit system.

We have achieved higher performance by optimizing chip designs to reduce crosstalk and develop new controller tuning features to avoid qubit errors. '

Google has been involved in the commercial quantum computer race for over a decade. The company returned to competition in 2006, when a member of the research team, Hartmut Neven, launched a project exploring how to apply this technology to machine learning. The company now has a dedicated quantum computer group and actively works with several universities.

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