

## Why Go Quantum?

Quantum computing will change the world as we know it. It will revolutionize optimization, which plays key roles in cybersecurity, the medical sciences, and financial services, among others. Individuals who learn about quantum will be at the forefront of future innovation.

### *What is Quantum Computing*

Quantum computing is a completely new paradigm of computation. Currently, computers manipulate individual bits, which store information as binary 0 and 1 states. Whereas, Quantum computers leverage a third state called “superposition” that allows them to represent a one or a zero *at the same time* to manipulate information. To do this, they rely on quantum bits or qubits.

With the help of quantum computing, the amount of time to adequately process and extract meaning from volumes of data is significantly reduced.

### *The Future is Quantum*

There are challenges that today’s classical computers, even the world’s biggest supercomputer, will never be able to solve. For problems above a certain size and complexity, there is not enough computational power to tackle them. That is why Quantum computing reimagines problems that have been previously impossible to solve.

Quantum computing is turning from theoretical to practical. Experts have already written over hundreds of research papers on the applications of quantum computing. A few of them include simulating chemistry and nature, optimization, and machine learning. Moreover, unlike classical encryption, quantum systems will change the landscape of data security and will provide virtually unhackable encryption.

In 2018, the National Quantum Initiative Act bill was signed by Congress to guide federal science agencies to invest in quantum technology. According to a Tractica report, the Quantum computing market is expected to grow strongly through 2030. Quantum computing’s market revenue is expected to reach \$9.1 billion annually by 2030, up from \$111.6 million in 2018. Currently, the largest tech companies such as Microsoft, Google, IBM, are all throwing tons of resources into quantum computing research, hoping to achieve a breakthrough that will make them a leader in this budding industry.

There is currently a shortage of trained professions, and quantum computer scientists are in high demand. There will be an even greater demand for quantum professionals, as companies like IonQ, Intel, D-Wave, and Google race to build bigger and better quantum computers.

### *The State of Quantum Education*

Despite the importance of quantum computing, there is limited quantum education available at the collegiate level, let alone K-12. And currently, many of the university programs are oriented around PhD degrees and research although there are increasing demands for a growing quantum workforce.

Teaching students quantum computing is training the next generation of innovators to impact billions. There has been a proven need for people to be trained in quantum computing, and right now, we are preparing K-12 students for the future of computing.