Nanotronics does not make quantum computers. We are the enablers of technologists in companies that with us strive to revolutionize the way information can be transformed. We have provided some of the world's largest companies and smaller entrepreneur innovators with the tools of modern computation and imaging. We work with those that build the most advanced materials and microelectronics. Nanotronics achieves this in the only way we see feasible for the continued exponential progression of technology, which is through artificially intelligent factories.

Quantum computing not only promises to break the barriers of encryption. It also breaks some fundamental barriers to human progress.

Many of our greatest achievements have been characterized in terms of competition, and as races. Often a technological race appears to be a war of ideologies, or of business dominance. With quantum computing, there is an even greater battle: the fight against physical scarcity.

There are three areas that we must work together on to win, not only for our nation, but for humanity:

1. Agriculture – New Fertilizers can feed the increasing population of the world, while maintaining diversity of crops.
2. Drug discovery by being able to simulate and produce molecules faster and with greater precision than are possible by traditional means. This will not only lead to cures for diseases, but reduce the often financially restrictive experimentation and trials that are required to make even incremental improvements in treatment.
3. Materials for new power devices from batteries to solar cells.

These have all been studied for decades, but in many respects the United States is still early on this journey. Companies are moving with speed, and with national support, it is possible that quantum computing can soon reach an inflection point. The race to achieve a workable quantum computer that can reduce scarcity to this level requires greater national attention than has currently been realized by either the vast majority of companies, or of our country as a whole. The steps to enabling quantum computing will need to involve:

1. An effort that funds the creation of factories for new quantum chips. A semiconductor fab for classical computers can cost as much as $20 Billion. To a large extent these fabs are not being built in the United States. We have an opportunity to acknowledge and to change this trend by leading the way in the construction of factories for this next generation of powerful computing.
2. Artificial intelligence. While quantum computing itself will increase the capabilities of artificial intelligence, the ability to design materials and software for quantum computers themselves, will come through the interaction of human and computer agents. Understanding such key elements as component design, fabrication conditions and the number of qubits needed requires a collaboration of humans and machines. The number of Qubits in a quantum Computer is directly related to the number of calculations. A 10-qubit quantum computer can produce 1000 calculations, and a 30 qubit quantum computer can produce 1Billion. Millions of Qubits are required to achieve the full potential of quantum computers. This exponential growth in qubit to calculations is beyond the reach of factories as they are. Without the advanced tools of AI for controlling factories, a truly useful Quantum computer factory may not be possible.
3. We need to develop the expertise required for the multidisciplinary nature of quantum computer science. Physics, chemistry, mathematics, computer science and application curiosity and expertise is a necessity. We cannot work in isolation. We need to embrace immigration and welcome strong talent from around the world with expertise in this area.

When we look towards the future we can see it as a battle of ideologies, of resources, or of technologies. Quantum Computing encompasses all of these to some extent. Quantum mechanics is the basis of universal behavior at the smallest of scales, but effects the largest of matter. It is therefore not surprising that harnessing this physical property has such far reaching implications. Because of this, it is important that we view it with the powerful associations that it warrants, with the weight of risk in a fractured world, or of great rewards in a unified one.

As we move forward we will see how Quantum computing lets us scale in ways that meet not only the needs of industry, but of our country and the world.

Dr. Matthew Putman

CEO, Nanotronics

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