Gx-Mode Processor

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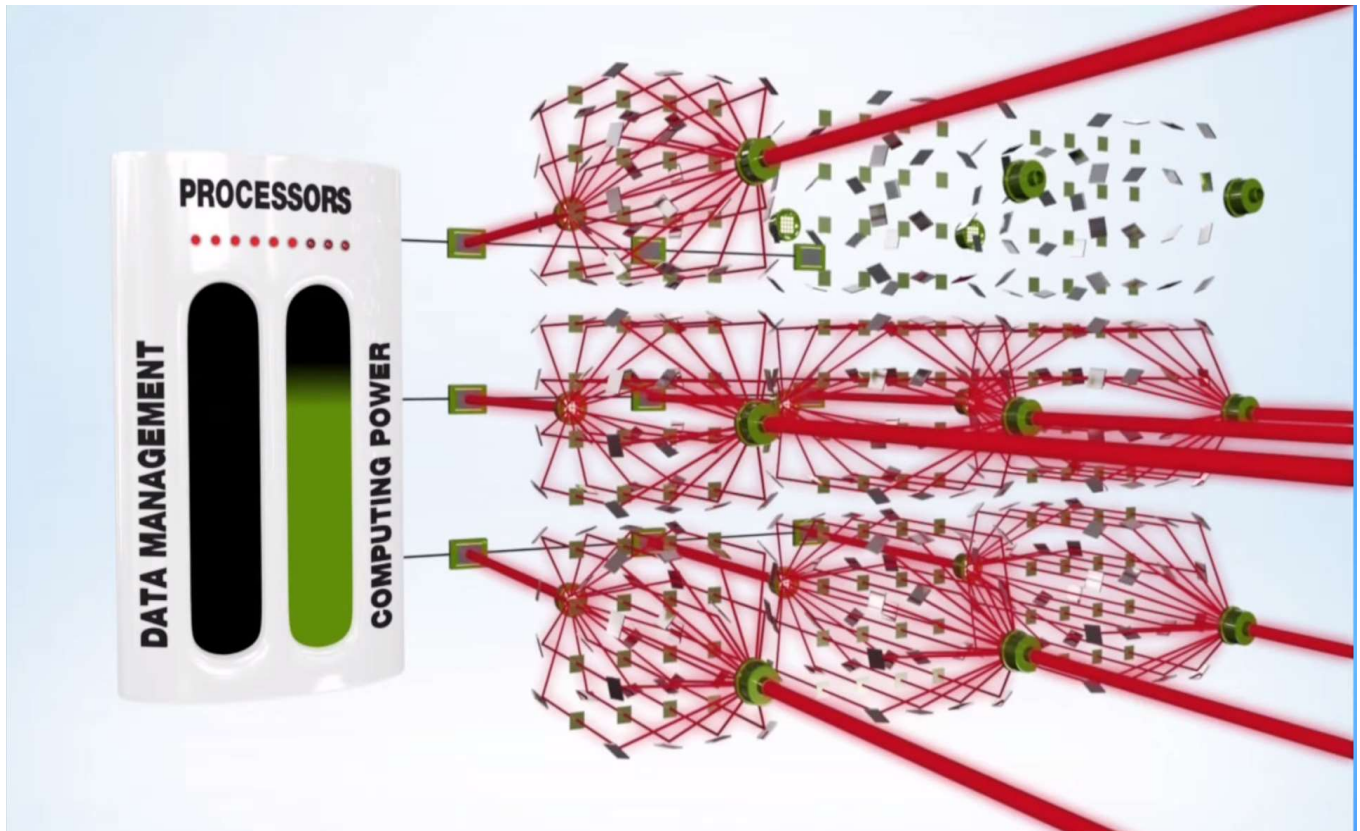
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Introduction

Current State of Innovation

Silicon Processors

Super-Computer

The Fujitsu A64FX is one of the most powerful Arm-based processors in the world, and the world's fastest supercomputer features over 150,000 of them.

Mainstream

Apple claims the M1 to be the fastest CPU in the world. Given our data on the A14, beating all of Intel's designs, and just falling short of AMD's newest Zen3 chips ∾ a higher clocked Firestorm above 3GHz, the 50% larger L2 cache, and an unleashed TDP, we can certainly believe Apple and the M1 to be able to achieve that claim.

Weakness: There are many but the limiting factor is: Traditional Linear Processing. Speed and power inefficiencies. Thermal and physical limits.

Quantum Computer

Current and projected Quantum Processor

In autumn 2019, Googles quantum computer Sycamore; in 200 seconds, the machine performed a mathematically designed calculation so complex that it would take the world's most powerful supercomputer, IBM's Summit, 10,000 years to do it. This makes Google's quantum computer about 158 million times faster than the world's fastest supercomputer.

Because the properties of quantum mechanics occur only at the tiniest scale, the slightest disturbance in the calculations is enough to make them ineffective. Even one atom of air or light particle can knock the vulnerable qubits off course, causing them to lose their superposition.

That is why the quantum chip in the laboratories of both IBM and Google is located at the bottom of a freezer in a large cabinet with components made of gold and copper, which cool the chip to almost absolute zero of -273.15 ºC. This construction is called a cryostat, and it is the only thing that allows researchers to perform calculations on a quantum chip at all.

Weakness: Ultra-complex programming: Quantum mechanics challenges our intuition; so we struggle to figure out the best algorithms for performing meaningful tasks. Decoherence,noise and inherent error behavior within the fundamental system. Contemporary quantum computers are unlikely to return correct answers for programs of even modest execution time.

In quantum mechanics, a no-cloning theorem says it is not possible to copy the state of one qubit onto another without altering the state of the first one. This means that it's not possible to directly translate our classical error correction codes to quantum error correction codes, says Joschka Roffe, a theorist at the University of Sheffield

NeuroMorphic Processor

A neuromorphic computer is a machine comprising many simple processors / memory structures (e.g. neurons and synapses) communicating using simple messages (e.g. spikes).

An international team of researchers led by Swinburne University of Technology has demonstrated the world's fastest and most powerful optical neuromorphic processor for artificial intelligence (AI), which operates faster than 10 trillion operations per second (TeraOPs/s) and is capable of processing ultra-large scale data.

The team demonstrated an optical neuromorphic processor operating more than 1000 times faster than any previous processor, with the system also processing record-sized ultra-large scale images -- enough to achieve full facial image recognition, something that other optical processors have been unable to accomplish

This is an excellent breakthrough.

Weakness: There are many but the limiting factor is: Traditional building blocks. Complex programming languages - Difficult to develop useful algorithms.
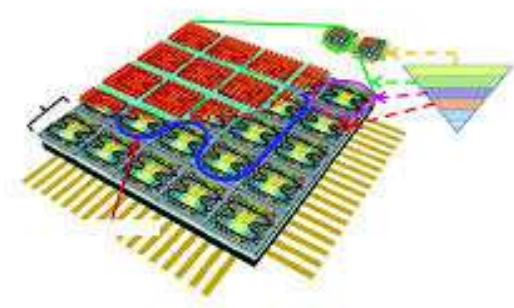
Gx-mode Device

A new type of computing device based on a radical principal of non-parallel, non-linear processing. The device is powered by modulated light operating in the Tera Hertz range. This is essentially a light based, non-linear processor.

This device is faster than current and future quantum computers by a significant order of magnitude(millions of times). The near infinite states per modulation variations is made possible by voltage controlled wave-plates. This is furthered enhanced by a new optical device: Micro-Combs – hundreds of tiny lasers on a chip.

The main base consists of a Trinary EOM device powered by independent modulated Micro-Combs. A Micro-combs are relatively new devices that act like a rainbow made up of hundreds of high-quality infrared lasers on a single chip. They are much faster, smaller, lighter and cheaper than any other optical source.
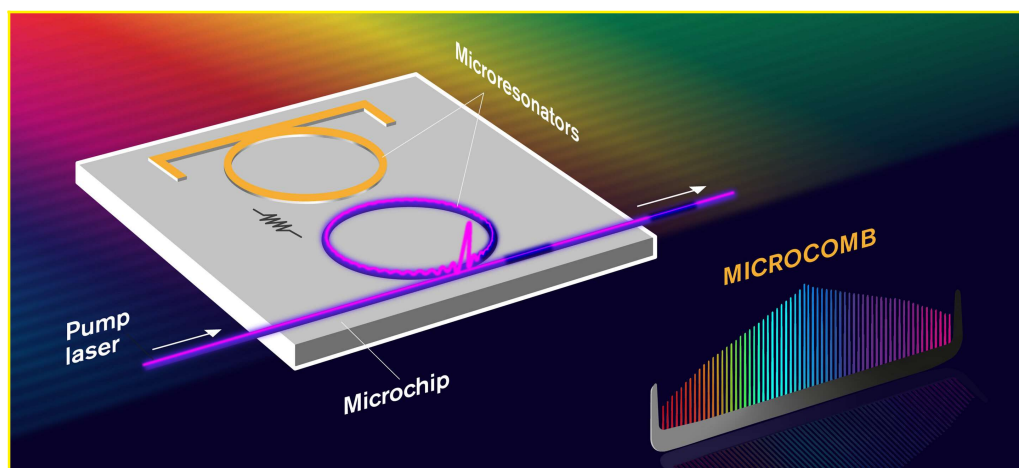
Micro-Comb basic structure (Chalmers University of Technology)

Potential Gx-Mode interconnection

Micro-Comb Prototype
(Junqiu Liu and Jijun He (EPFL))

Principal of Operation

Hardware

Main Processing

- Trinary EOM device powered by independent modulated Micro-Combs

- Performs 3n3 order of independent – non linear processes per cycle operating in the Tera Hertz range

- Current serial and parallel computation concepts of current processors does not apply to this new device

- Each Trinary EOM is embedded on a memory module. This module is the core of a singular object.

- Each object is interconnected into a grid-matrices so as they can access each other. Interconnection occurs via modulated lasers for maximum throughput and execution

As we can see, each object is a self-contained unit. There can be Millions/Billions of objects on a single chip.

Video/Audio

- Standard light to classical silicon modulation can be used to output High Frame Rates and 3D video overlays and content.

- Same for Audio (Multiple channels + overlays)

Light Speed Data

- Light speed and holographic data can be bi-direction transferred to the Gx-Mode device via optical/laser interface

- Light based data can be demodulated into classical formats for use on standard computers

- Multiple **Real-time** holograms can also be output by holographic devices

Software

Software does NOT consist of program code nor a programming language as is the case for current processors including quantum(QBit) processors.

- Software consists of objects only
- Objects consists of tiny routines + singular/multiple data-set {Database/Audio/Video/Data-File/etc}
- Relationships between objects dictate execution of next or adjacent process (in objects)
- Routines in objects executed in a non-linear fashion
- Relationships between objects determine the overall process of operation

Initially, programming can be achieved by a standard computer interfacing to the Gx-Mode device via a laser/light bridge.