THE FUTURE OF COMPUTING

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Common Beliefs

Computers will be embedded in everything

- Buildings
- Highways
- Vehicles
- Clothing

Combine physics with current technology

Moore's Law

Out of Date Definition

"The number of transistors in a dense IC doubles every two years"

◦ What about when we switch to new technologies?
  ◦ Optical Computing
  ◦ Quantum Computing
  ◦ Bio Computing

Proposed Definition

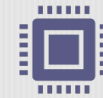# Optical Computing

Higher Bandwidth

Fiber optics are slightly faster than silicon transistors

Size Considerations

Surface Plasmons – excited electrons which dance on the surface of a material to travel like a photon

Practical Application

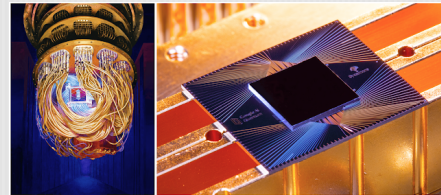Long-distance communication between processor cores

Quantum Computing

How it works (sort of)

◦ Qubits

◦ Parallelism

◦ Estimated to be millions of times faster than conventional computing

What it could do

◦ Shor's algorithm

◦ Break the internet

◦ Potentially other undiscovered applications

Bio Computing

Biochemical Computers

Use biological chemical reactions for computations

Biomechanical Computers

Mechanical shape of molecule determines output

Bioelectronic Computers

Electrical conductivity of reactions is observed output

References

- https://bgr.com/2015/11/27/google-glass-2-design-patent/
- https://www.futureforall.org/computers/computers.htm
- https://en.wikipedia.org/wiki/Optical_computing
- https://en.wikipedia.org/wiki/Biological_computing
- https://www.explainthatstuff.com/quantum-computing.html
- https://ai.googleblog.com/2019/10/quantum-supremacy-using-programmable.html