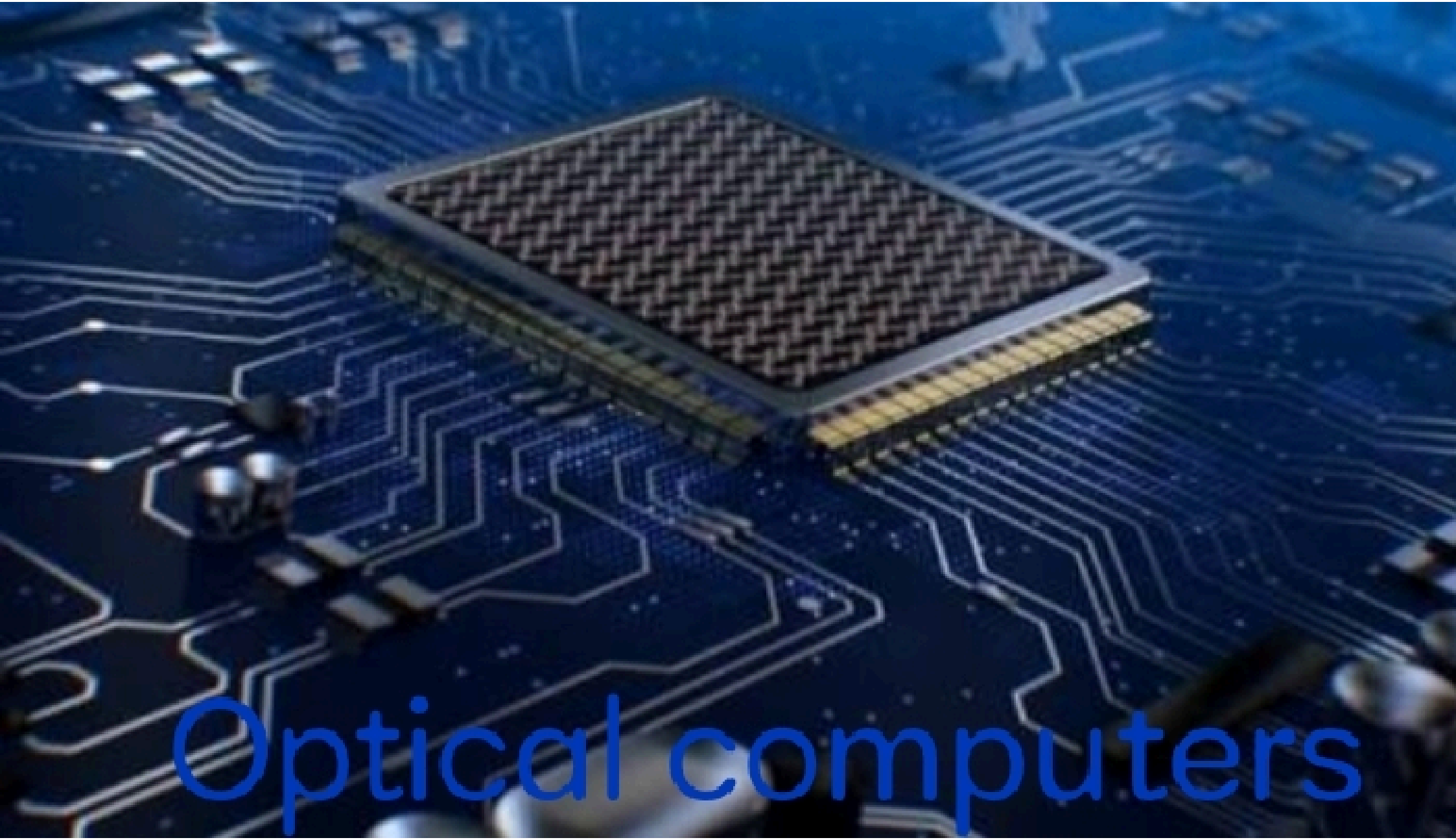

Optical computers

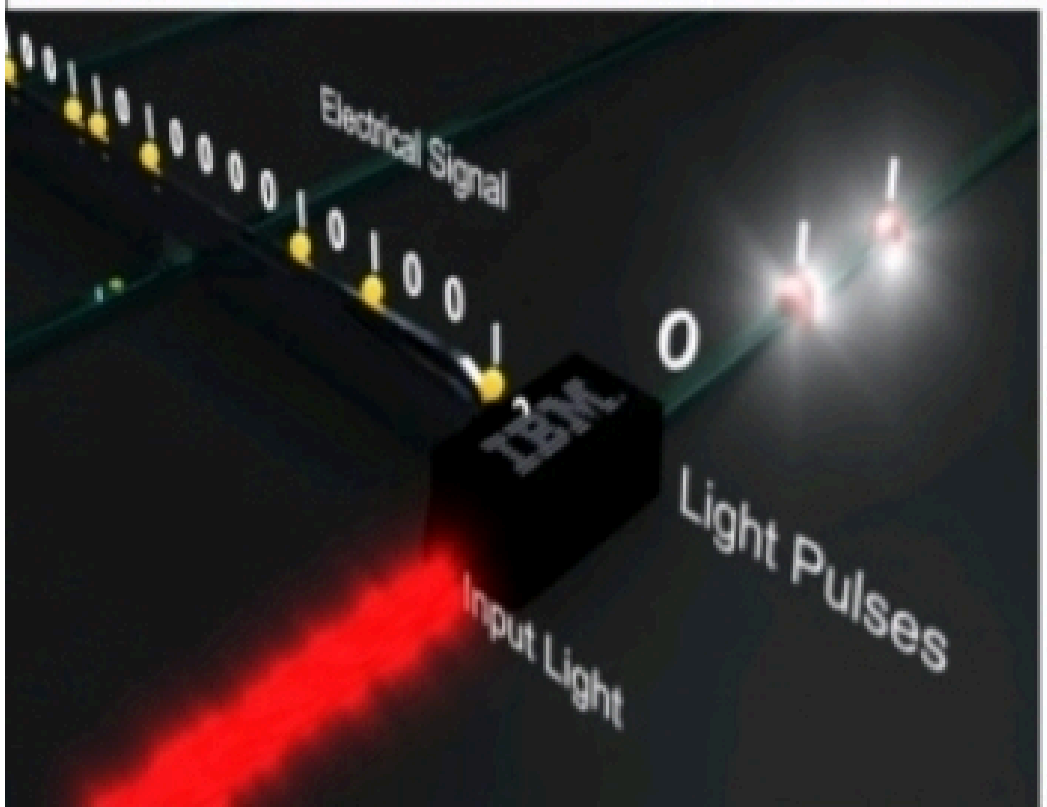
CONTENTS:

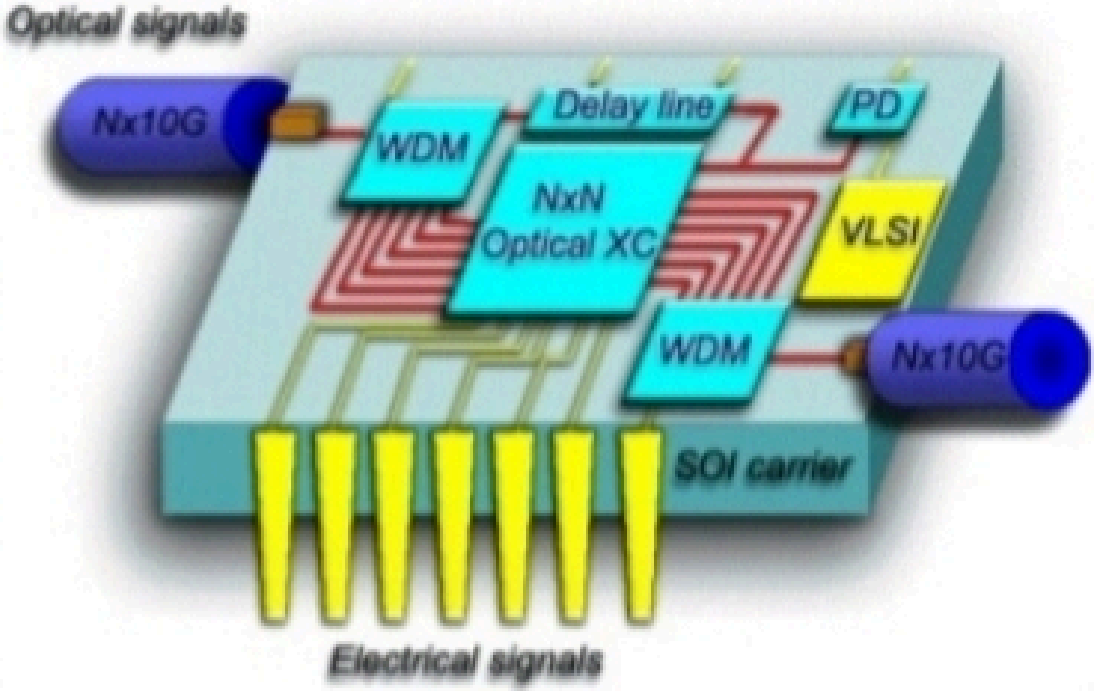
- What is optical computers.
- Why optical computers.
- Example.
- Optical computation.
- Parallel communication.
- Optical components.
- Advantages.
- Disadvantages.
- Conclusion.

Devarapalli Dinesh

WHAT IS OPTICAL COMPUTER...

- An optical computer is a computer that uses photons in visible light or IR beams to perform digital computation .





WHY OPTICAL COMPUTERS...?

- In silicon computers, the speed of computers was achieved by miniaturizing electronic components.
- They are immune to electromagnetic interference, and free from electrical short circuits.
- They have low-loss transmission and provide large bandwidth; i.e. multiplexing capability, capable of communicating several channels in parallel without interference.

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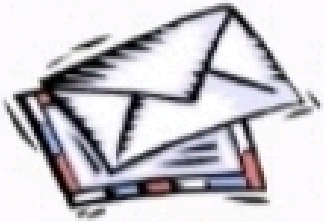
EXAMPLES

Consider E-mail



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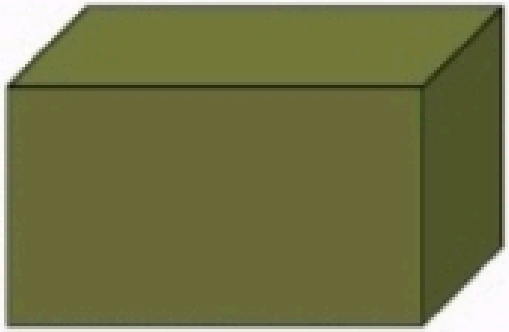
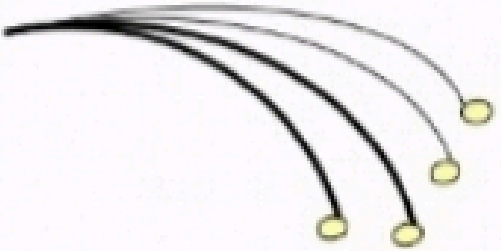


Electronic To Photonic Converter



Fiber optic cables

- Optical computers use light for storing and transmitting and operating on data.

OPTICAL COMPUTATION

- Light in the place of Electron
- Uses optical components
- Transistors, logical gates etc. are simulated using optics.
- All-optical components require a high level of laser power to function as required.
- Send pulses of light instead of pulses of electricity

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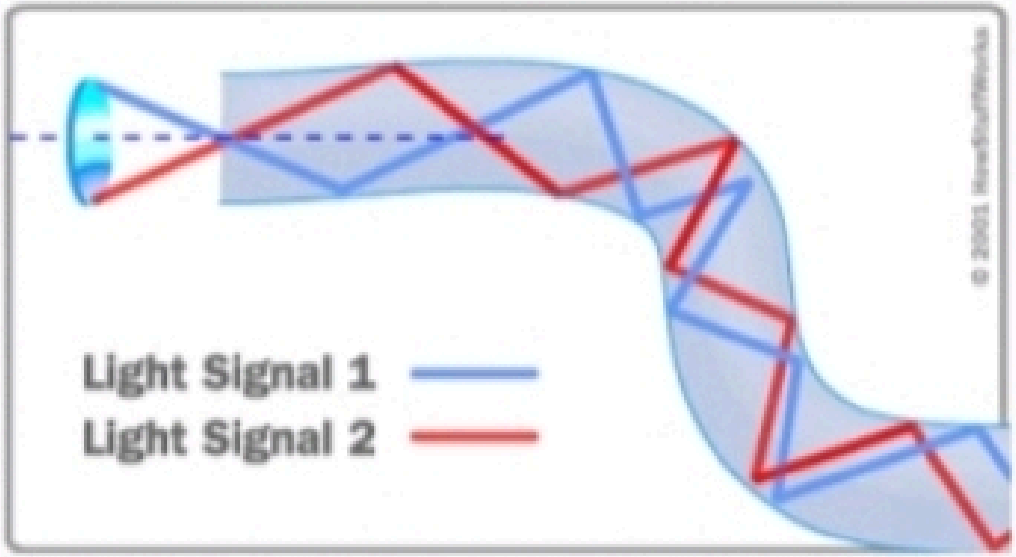
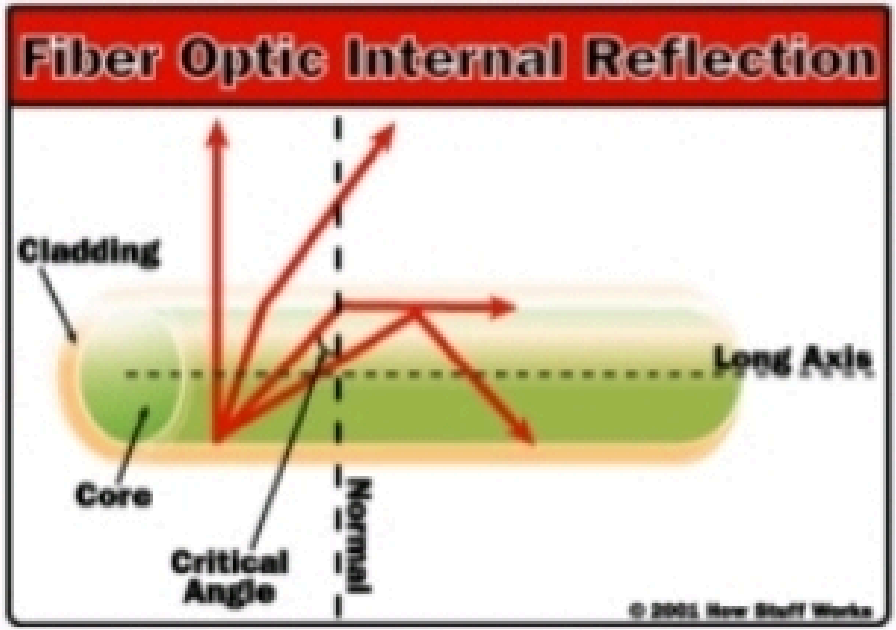
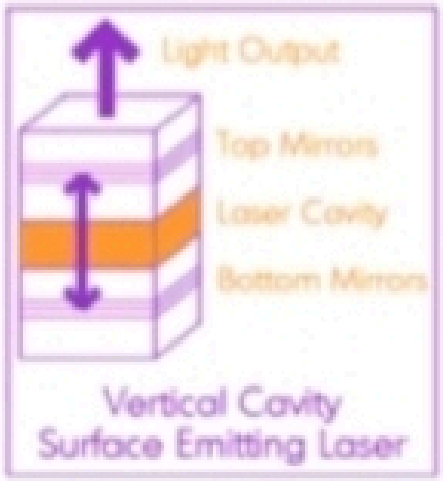
PARALLEL COMMUNICATION





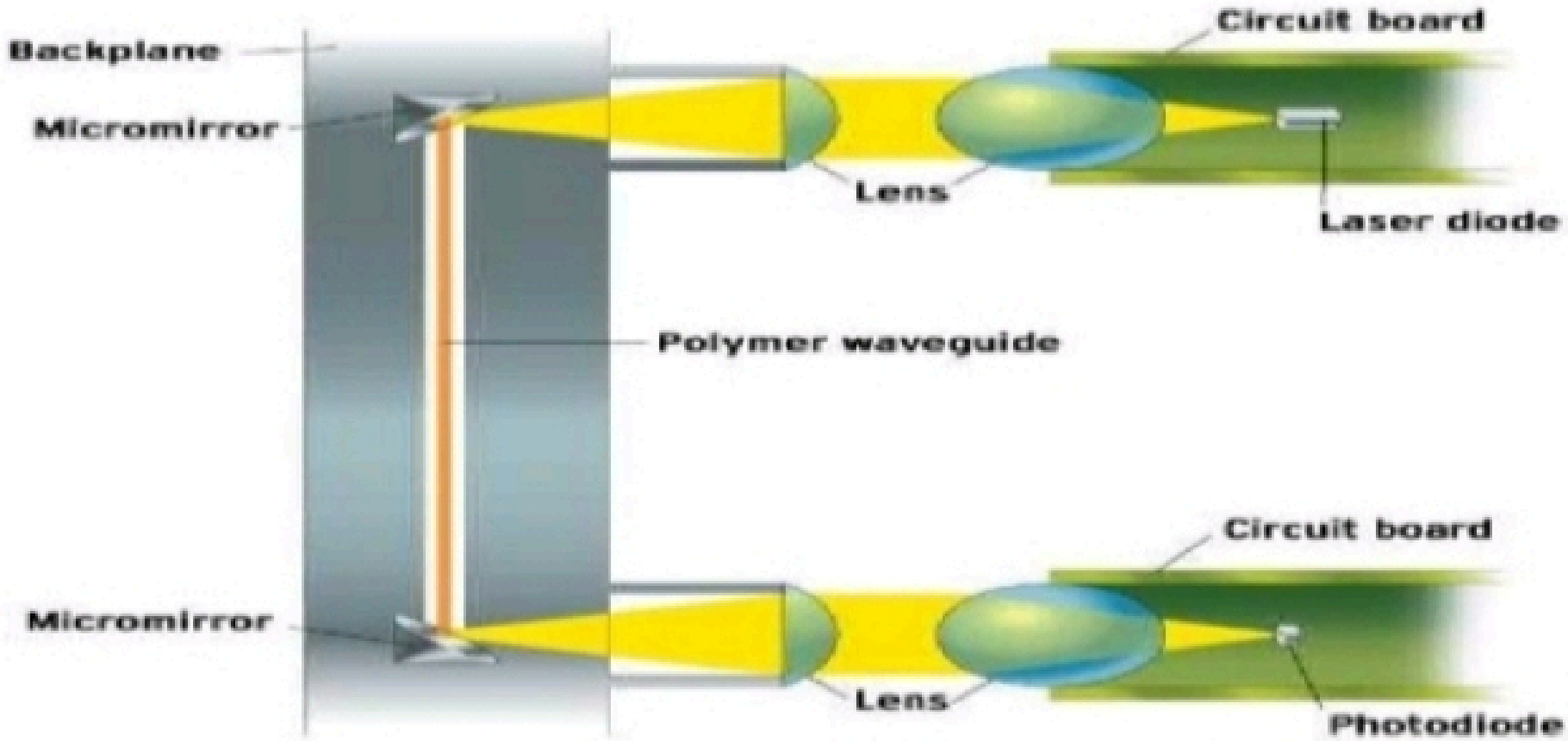
OPTICAL COMPONENTS...

- **VCSEL-**
- VCSELs have high performance and low cost advantages
- Emits light in a cylindrical beam vertically from the surface of a fabricated wafer.



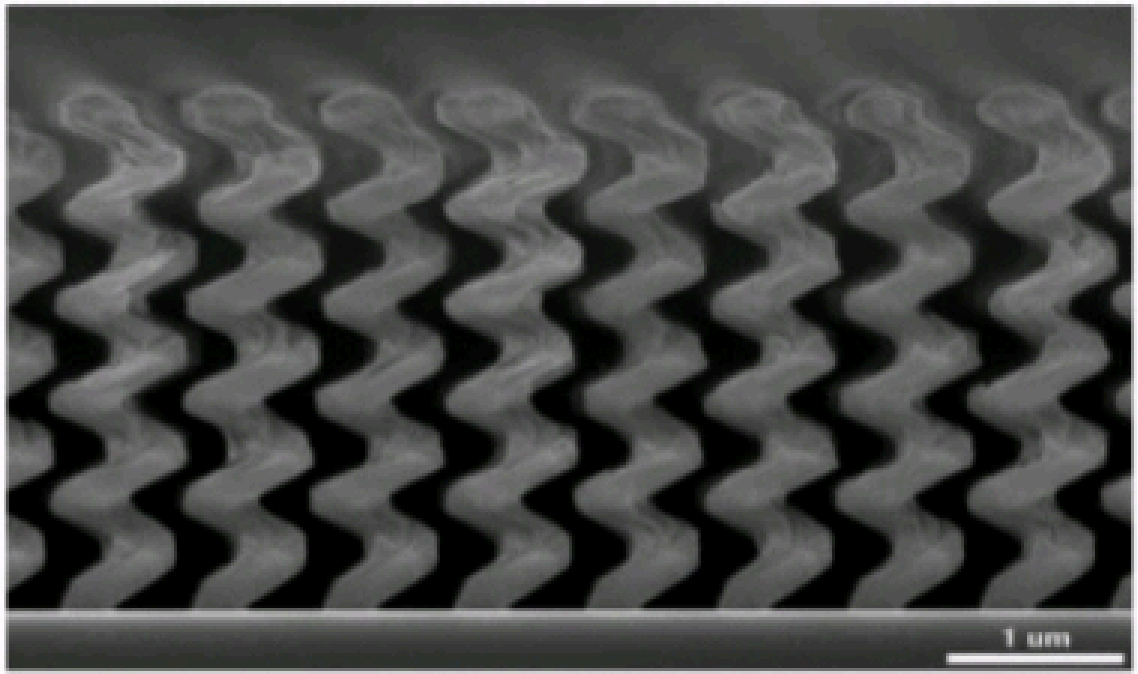
Optical interconnection of circuit using VCSEL and photodiodes

- VCSEL converts the electrical signal to optical using lens and micromirrors



- **Photonic Crystals**- crystals designed to replace transistors in optical computers.

- Optical nanostructures that are designed to affect the motion of Photons.

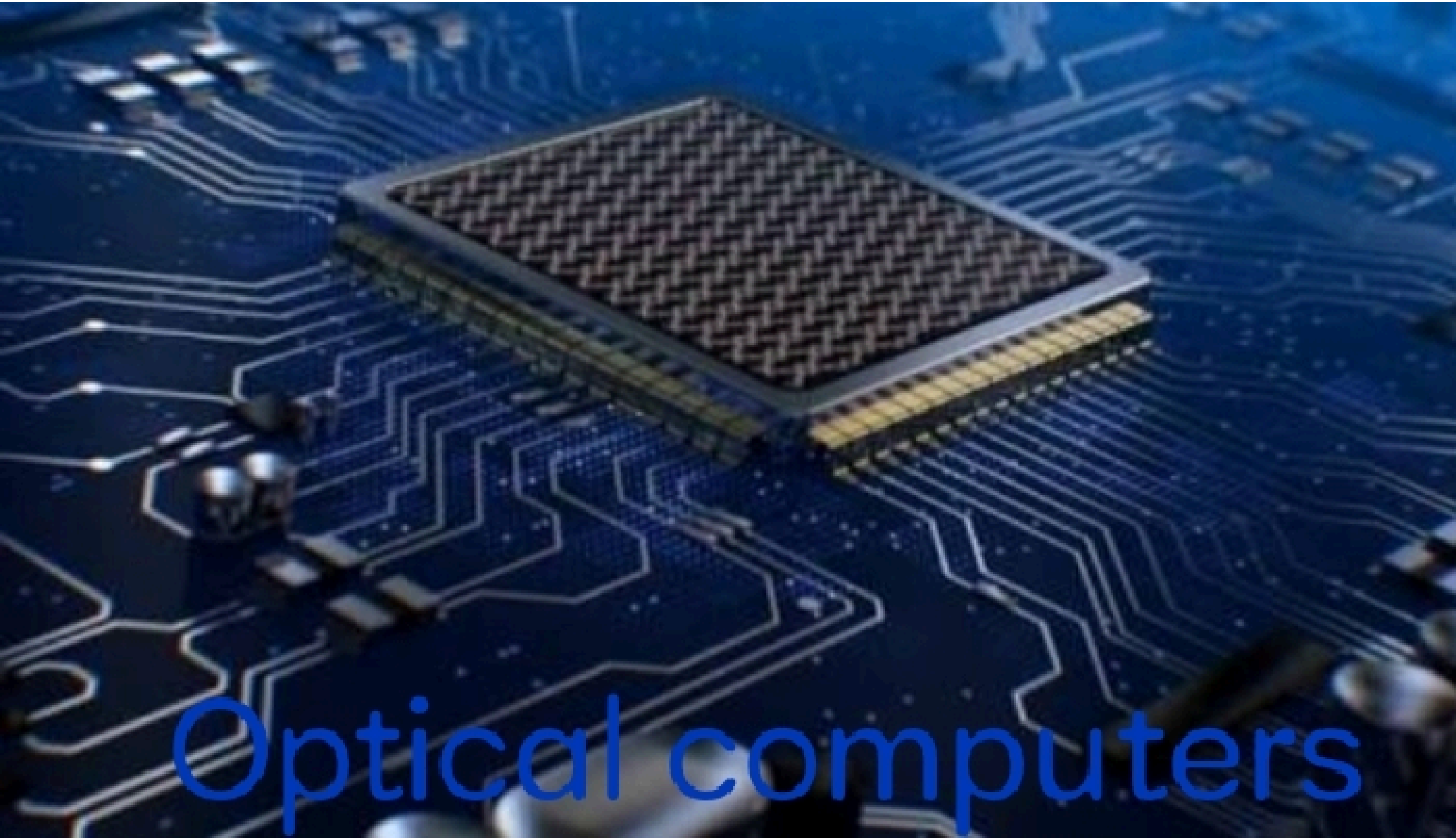


ADVANTAGES...

- Increase in the speed of computation.
- Free from electrical short circuits.
- Have low- transmission loss and large bandwidth.
- Speed of light in photonic circuits will be close to speed of light in vacuum
- Capable of communicating several channels in parallel without interference.
- Possesses superior storage density and accessibility
- No power loss due to excess of heating.
- Life of the hardware of optical computer is more.

DISADVANTAGES

- Optical components and their production is expensive.
- Optical components are not miniaturied enough yet.
- problems of exact manufacture.
- In compatibility.
- Due to interference caused by dust particles.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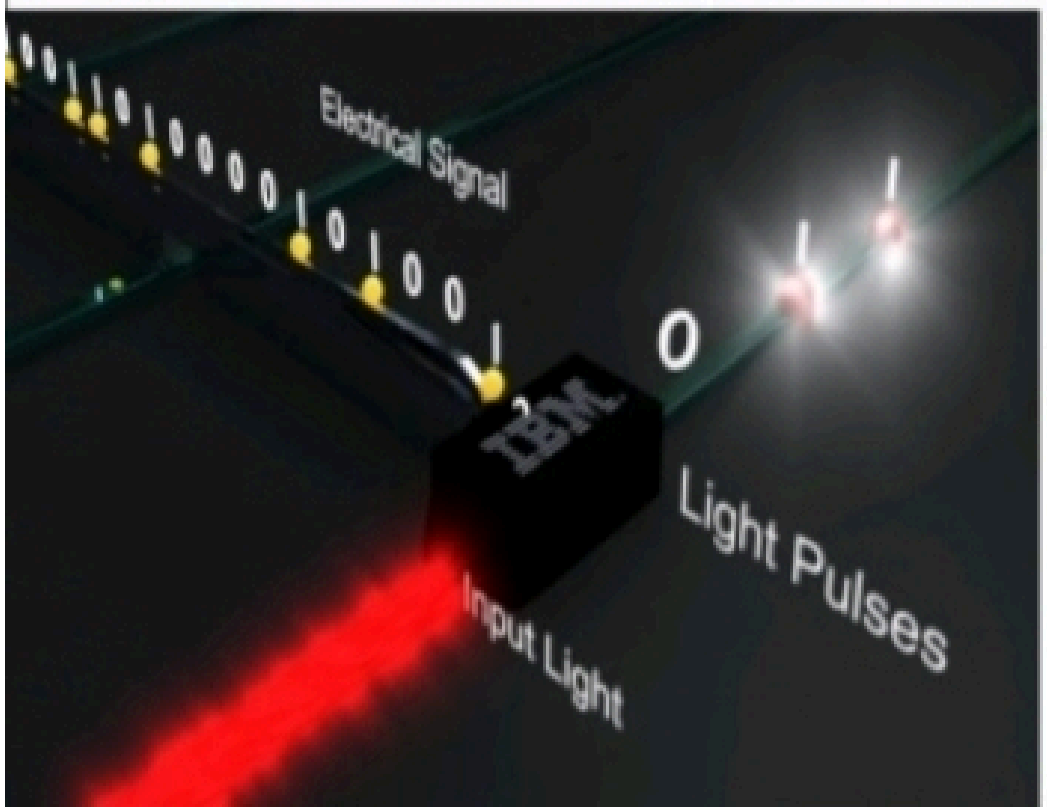

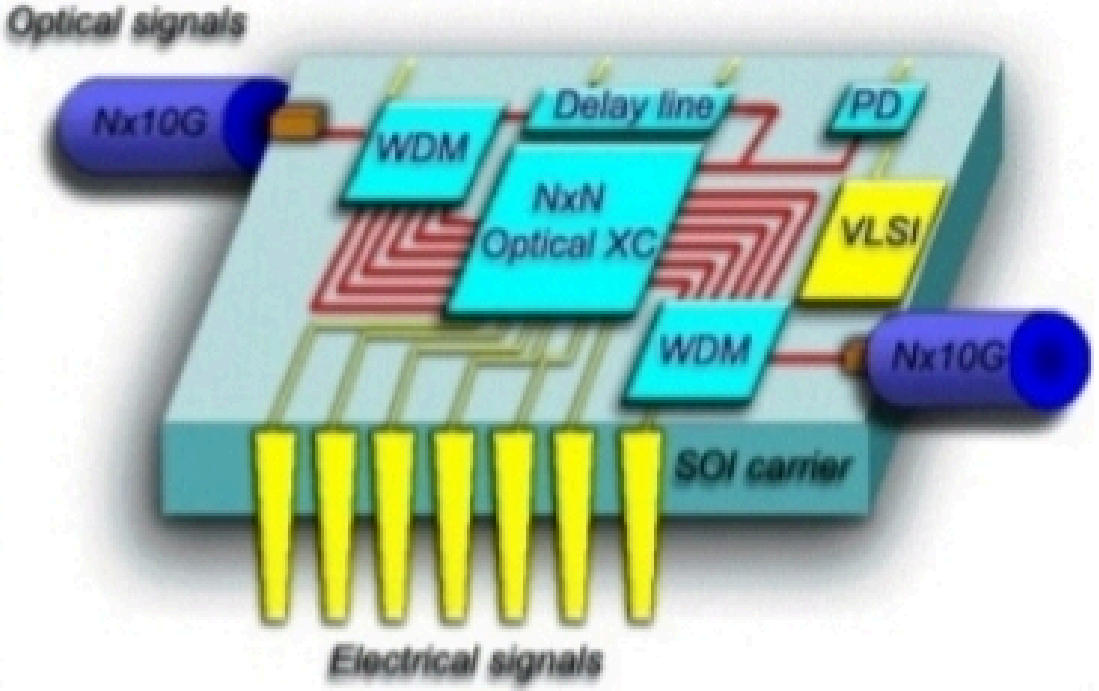

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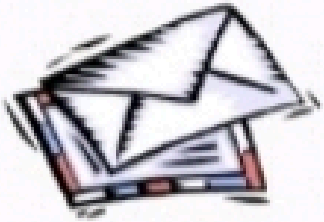

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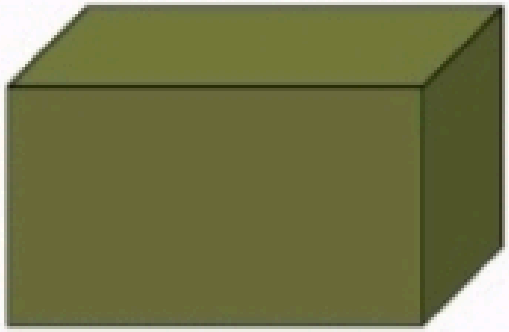

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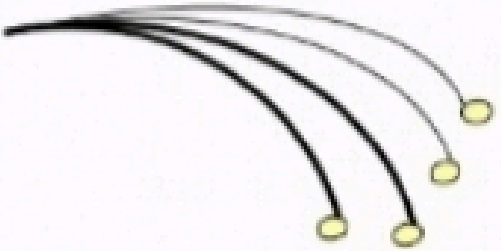

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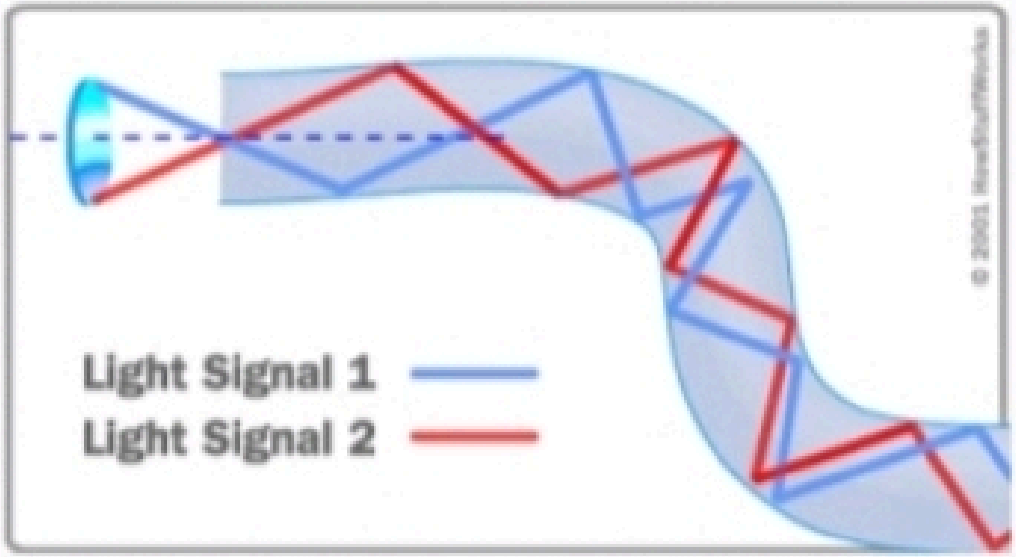

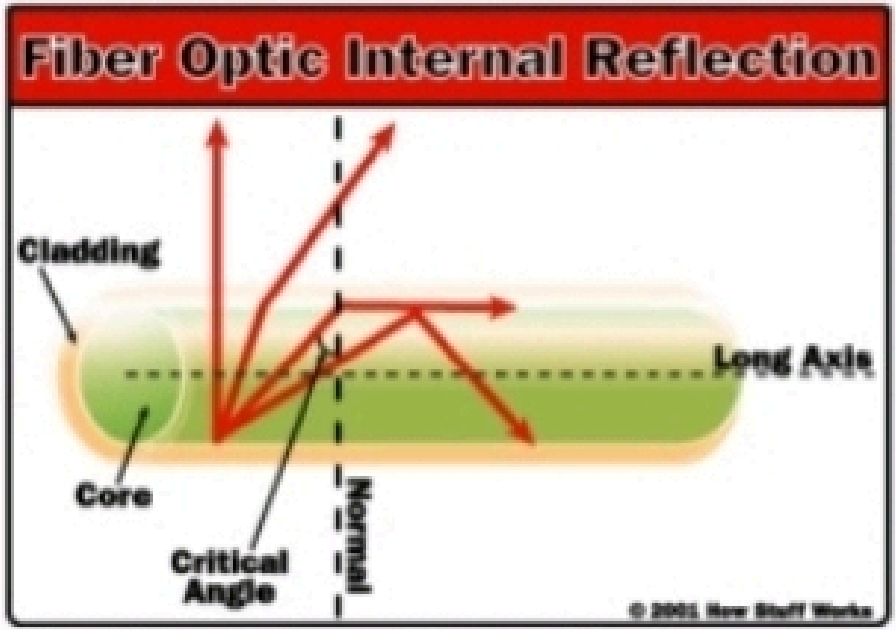

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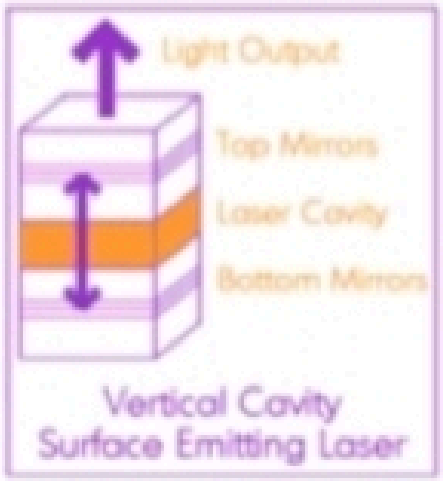

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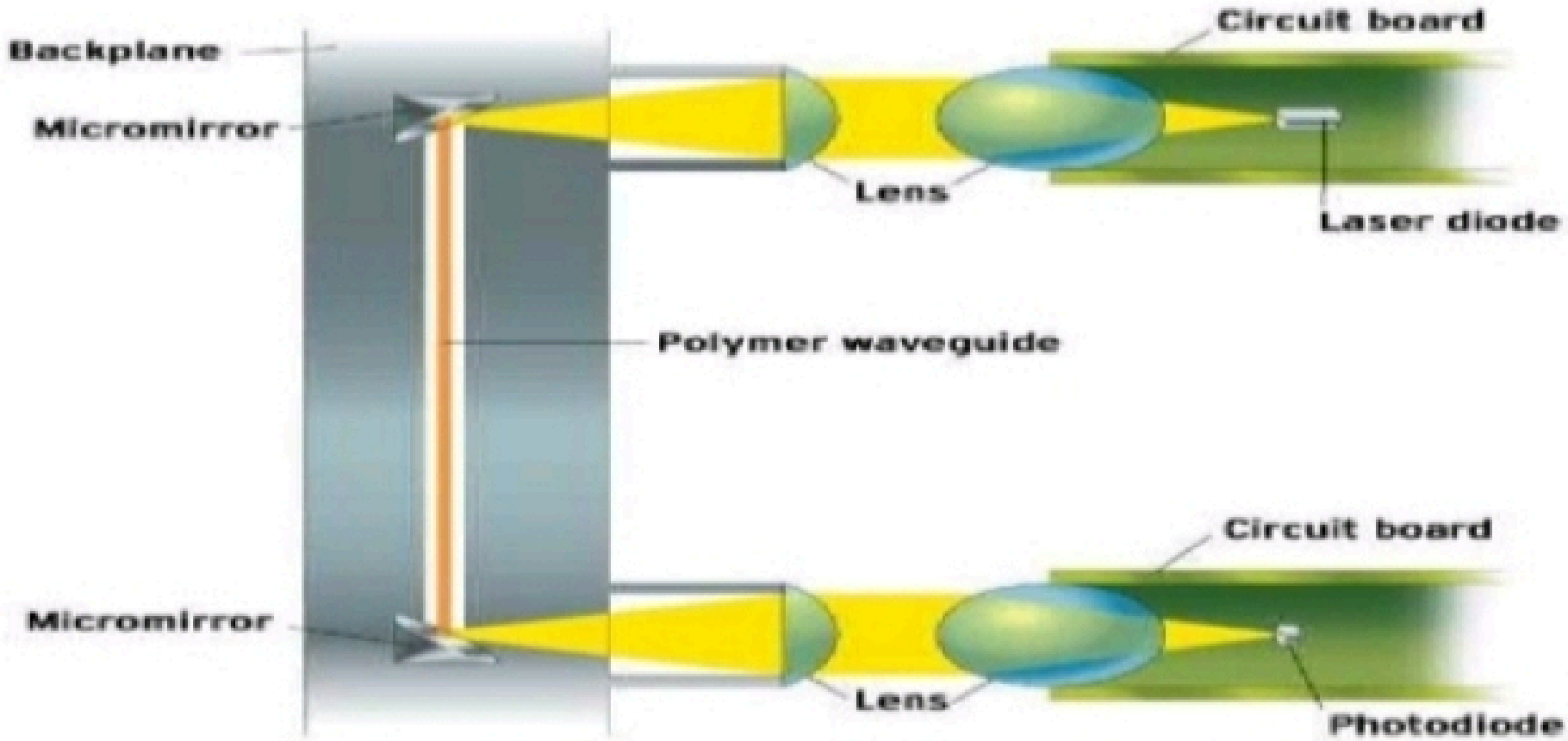

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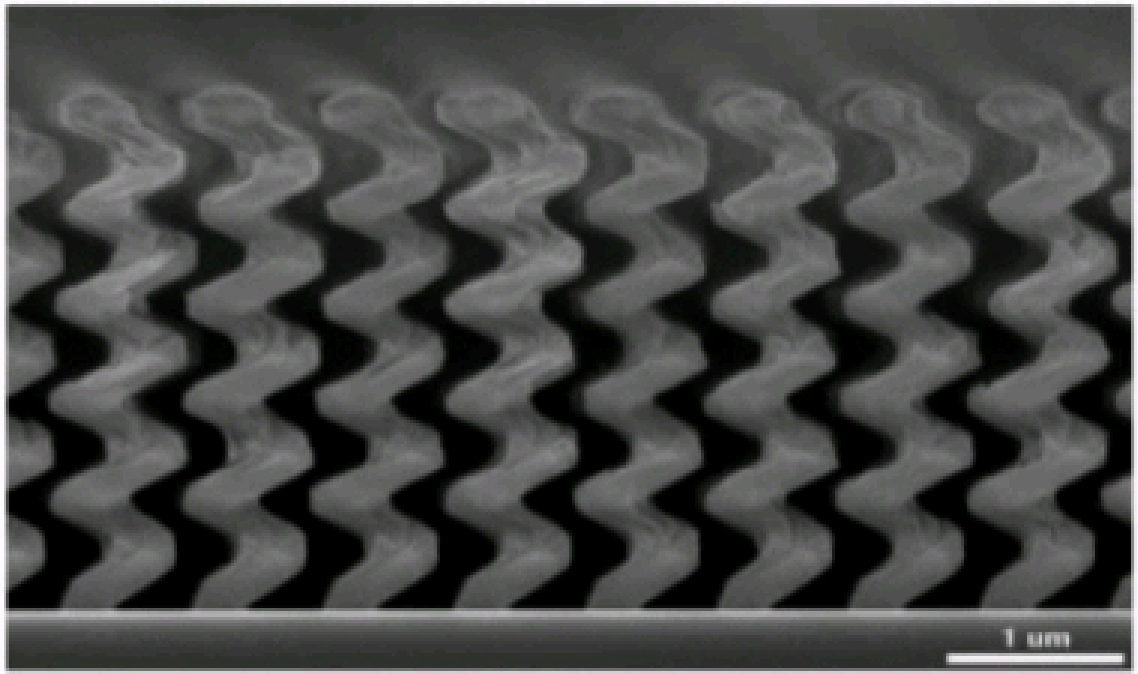

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CONCLUSION

- Optical technology promises massive upgrades in the efficiency and speed of computers, as well as significant shrinkage in their size and cost.

- Even though pure Optical computer has many challenges hybrid opto-electrical computer can be expected very soon, and in near future pure optical computer too..


Any aueres

Thank you

By

Dinesh Devarapalli