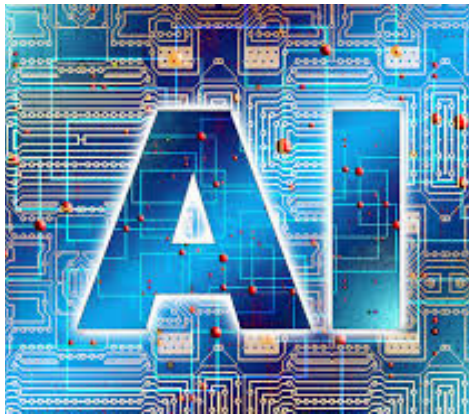
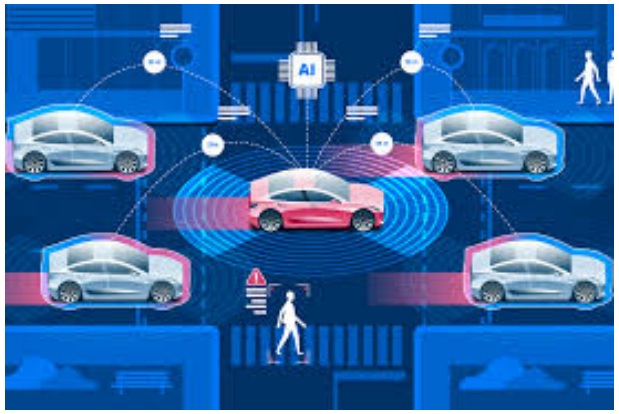
SPINTRONIC

Big data (sens, store, compute) = Big Energy

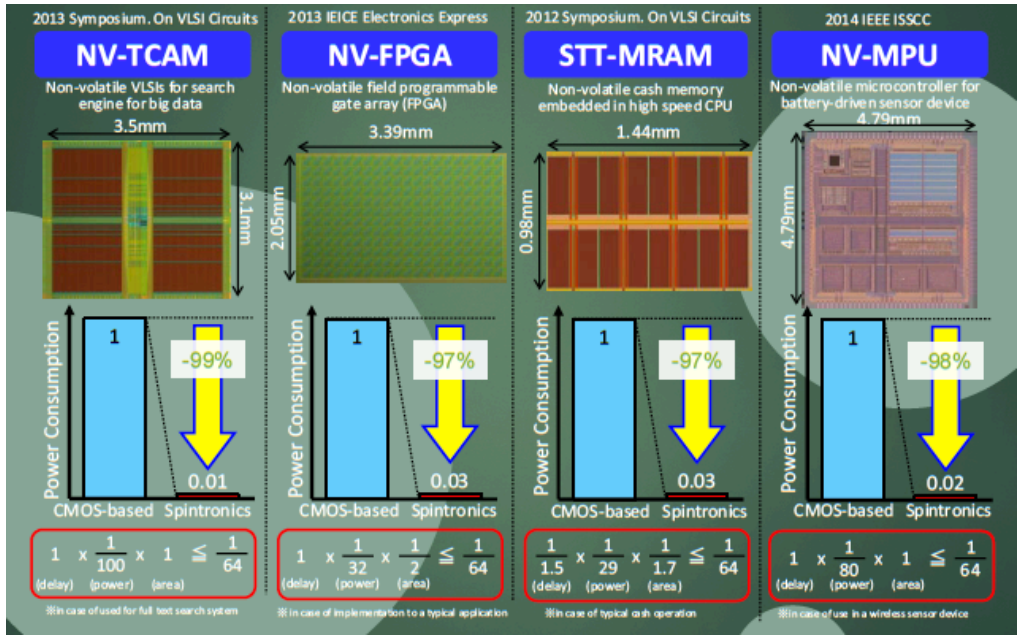




Interconnected device produce 4% global emission Today – 15 % in 2040

Digital world consume 10% of world electricity Today – 100 % in 2050

Spintronics to reduce energy consumption for data usage/storage



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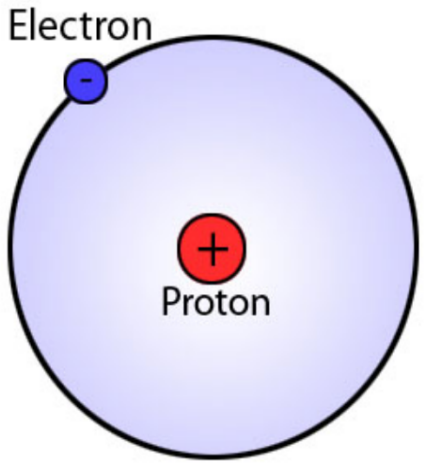
SPINTRONIC ?

ELECTRONIC

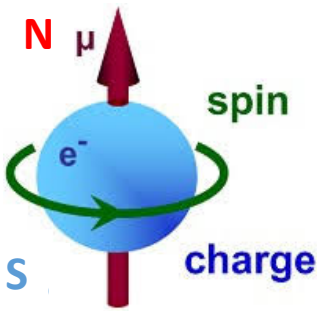
- Electron : 1897 (JJ Thomson)



- First transistor : 1947 (Bell Lab)

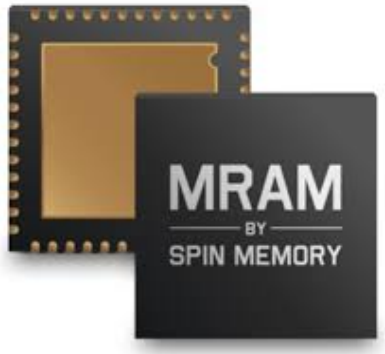
SPIN ELECTRONIC : SPINTRONIC

- Spin : 1924 (W. Pauli)



- Spintronic: 2007 Nobel (A Fert / P Grunberg)

- Freescale : 2006
  First commercialisation



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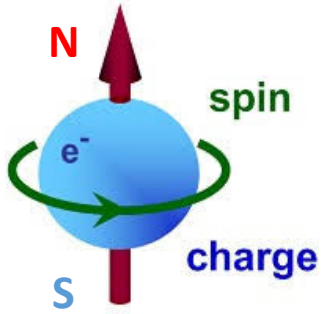
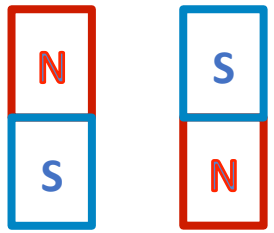
SPINTRONIC



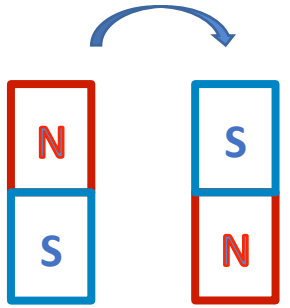
Spintronic allows

- To read magnet
- To read information

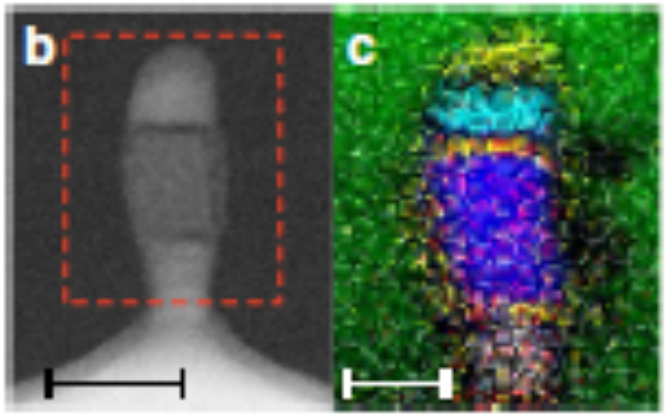


« 0 » « 1 »

- To manipulate magnet
- To write information

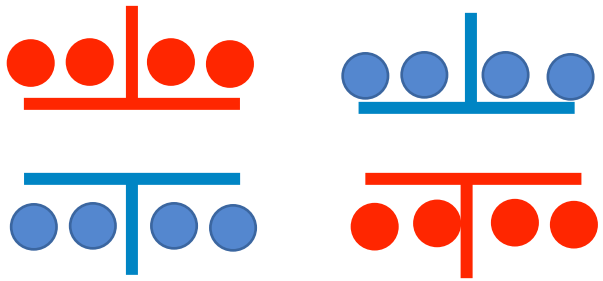


« 0 » « 1 »



20 nm 20 nm

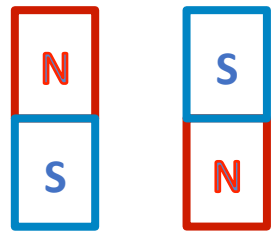
Energy gain



« 0 » « 1 »

Needs Energy to be maintain

Volatile- Memory



« 0 » « 1 »

Needs NO Energy to be maintain

Non Volatile- Memory

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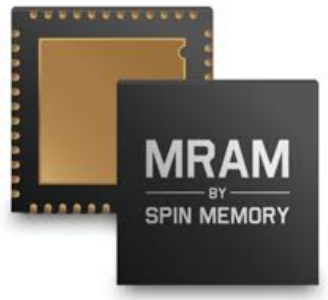
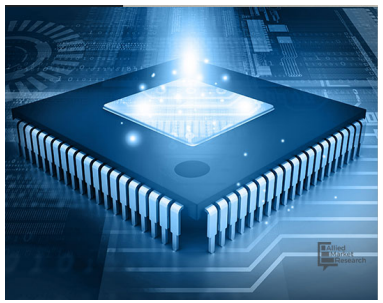
SPINTRONIC

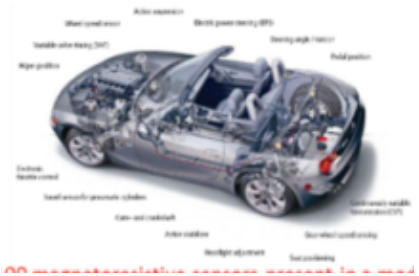
Memory	Logic	Sensors	Computing	Energy	RF devices

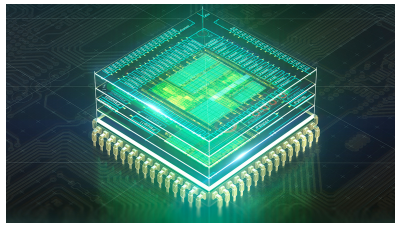




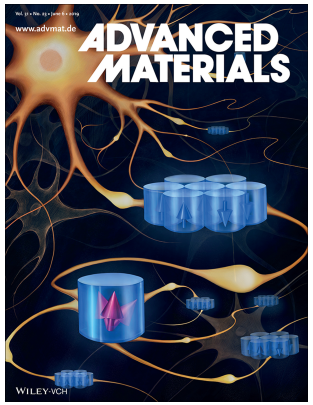
$ 21.89 Bi by 2026
(CAGR: 34,7)

Spin-ION TECHNOLOGIES
The next memory revolution

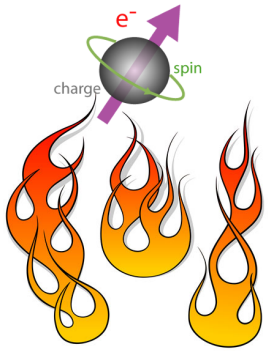




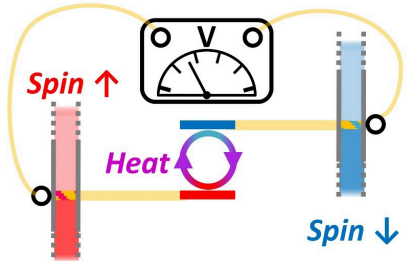
Quantum Computing



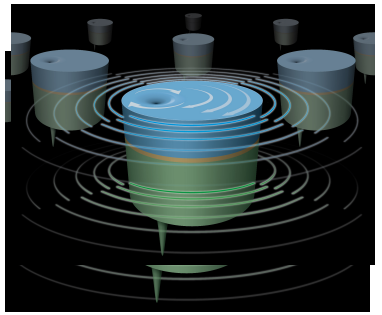
neuromorphic computing



Spin caloritronic



Spin driven electrical power generation



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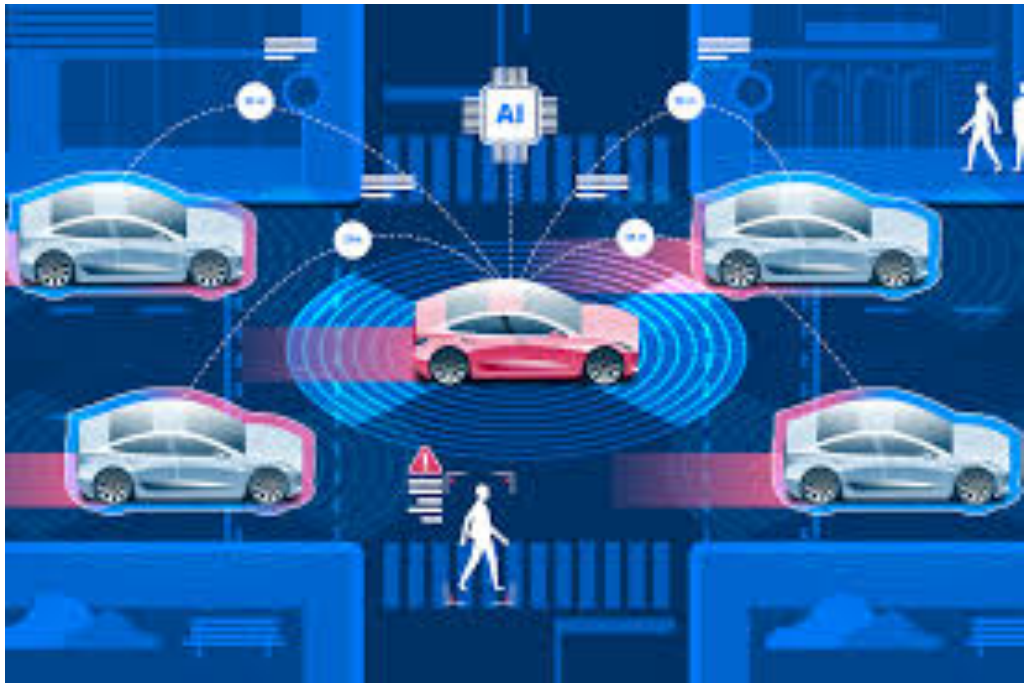
SPINTRONIC

Example 1: AI chips for autonomous driving

Fully autonomous requires 1000 TOPS (trillion operations per second) to safely guide the automobile :

Today the energy required : **1000 W**



AI chip using spintronics technology

10 W by 2030
1 W by 2040

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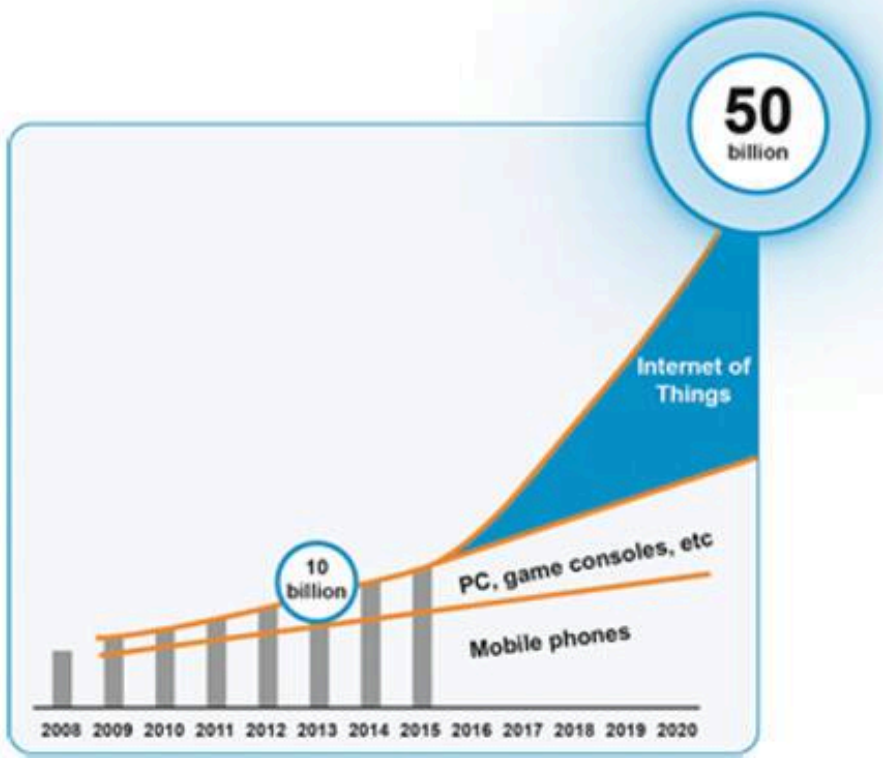
SPINTRONIC

Example 2: Internet of things

Sensors – collecting data

Memories – Store data

Computers – To analyse Data



Spintronic could bring 50% energy reduction compared to conventional electronic expected by 2030.

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SPINTRONIC

- Spintronic chips already on the market

- Investment and integration of talent needed for mass production

- Industry / Academic collaboration (pilot line)

Asia

USA

Europe

THANK YOU
FOR YOUR ATTENTION

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