



POLITECNICO
MILANO 1863



Ingegneria ELETTRONICA

prof. **Franco ZAPPA**

Corso di Studi
Scuola
Career Service

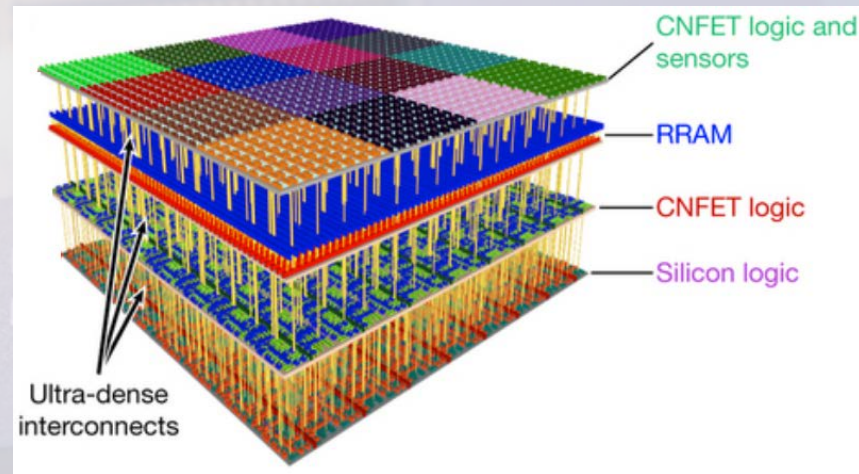
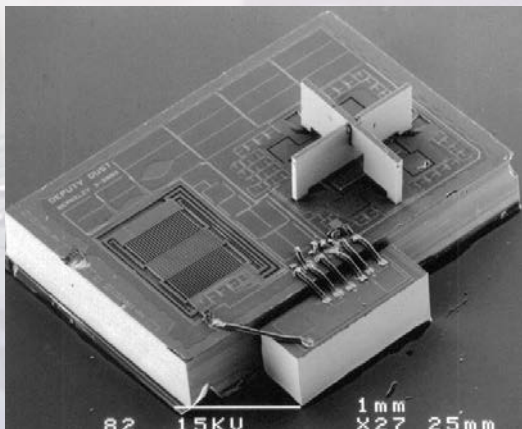
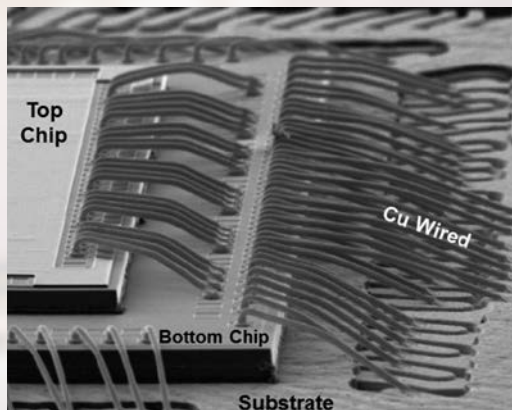
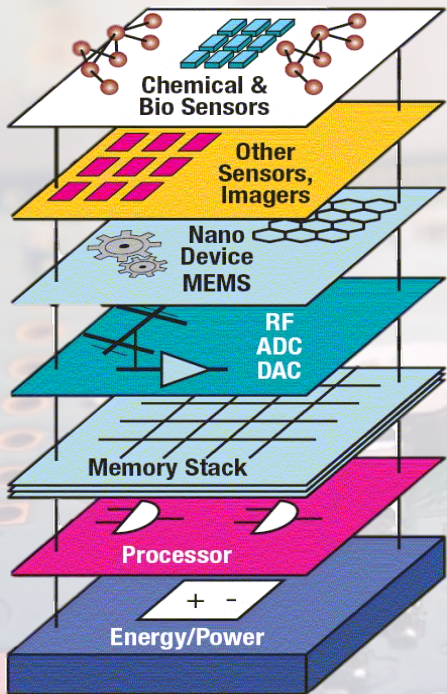
www.elettronica.polimi.it
www.ingindinf.polimi.it
<http://cm.careerservice.polimi.it>



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Elettronica per *smart devices*





3D nanosystem chip. Top: sensors and more than one million carbon-nanotube field-effect transistor (CNFET) logic; on-chip non-volatile RRAM; CNFET logic with classification accelerator; bottom silicon transistor logic (Max M. Shulaker et al./Nature)



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Elettronica per automotive e self-driving

Infotainment & Telematics

- Hands Free Telephony
- Navigation
- DAB & IBOC Receivers
- E-Calls, B-Calls, S-Calls
- Automotive Hybrid TV Receiver
- DVD Playback, Radios
- Storage Devices

Vehicle Bus Communication

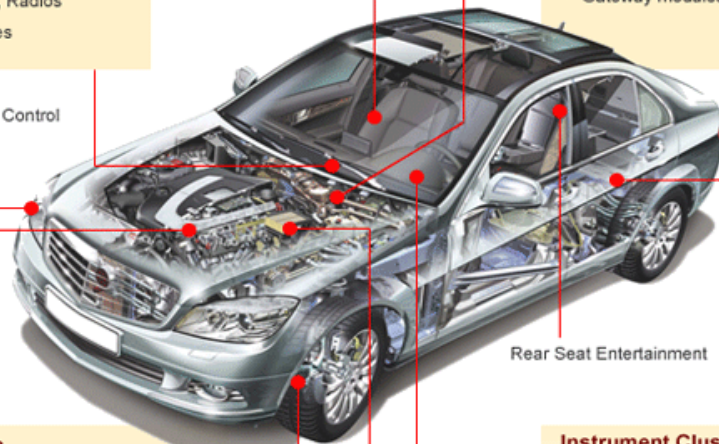
- Multimedia Bus Interface like MOST & 1394
- CAN, J1850, LIN, GMLAN, UART, FROS

Body Electronics

- Power Windows & Mirror Control
- Remote Keyless Entry
- Smart Junction Box
- Power Liftgate
- Gateway modules

Seating Systems

Adaptive Lighting Control



Rear Seat Entertainment

Power Train & Engine Management

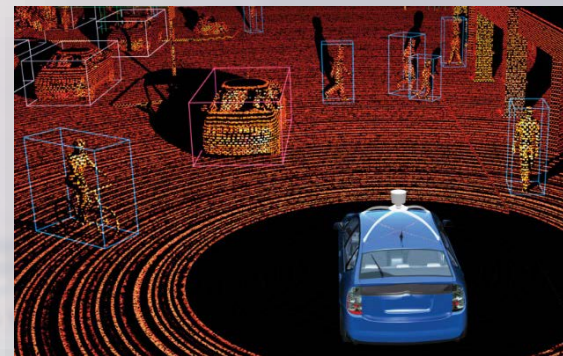
- Diagnostic Tests and Interfaces
- Complex and Simple IO Development
- Model Based Software Development
- Model-In-Loop
- Software-In-Loop
- Hardware-In-Loop

HEV/EV

- Vehicle Energy Management System
- The Pressure Monitoring Systems
- Modelling of Suspension Systems

Instrument Clusters

- Hardware Architecture
- HMI Components
- Reusable Components
- Integration and Validation
- Dot-matrix, TFT display
- Telltale



Front camera:

- Audi active lane assist
- ACC stop&go
- Speed limit display
- Audi pre sense / front / plus
- Audi adaptive light with continuous headlight range control

Ultrasonic sensors at side:

- Park assist

Rear camera:

- Parking system plus with reversing camera
- Park assist with reversing camera

Ultrasonic sensors at rear:

- Parking system
- Park assist

Ultrasonic sensors at front:

- ACC stop&go
- Parking system
- Park assist

Infrared camera:

- Night vision assistant with highlighting of detected pedestrians



Front radar sensors:

- ACC stop&go
- Audi pre sense / front / plus

SARA sensor:

- ESP
- Audi pre sense basic

Rear radar sensors:

- Audi side assist
- Audi pre sense rear / plus

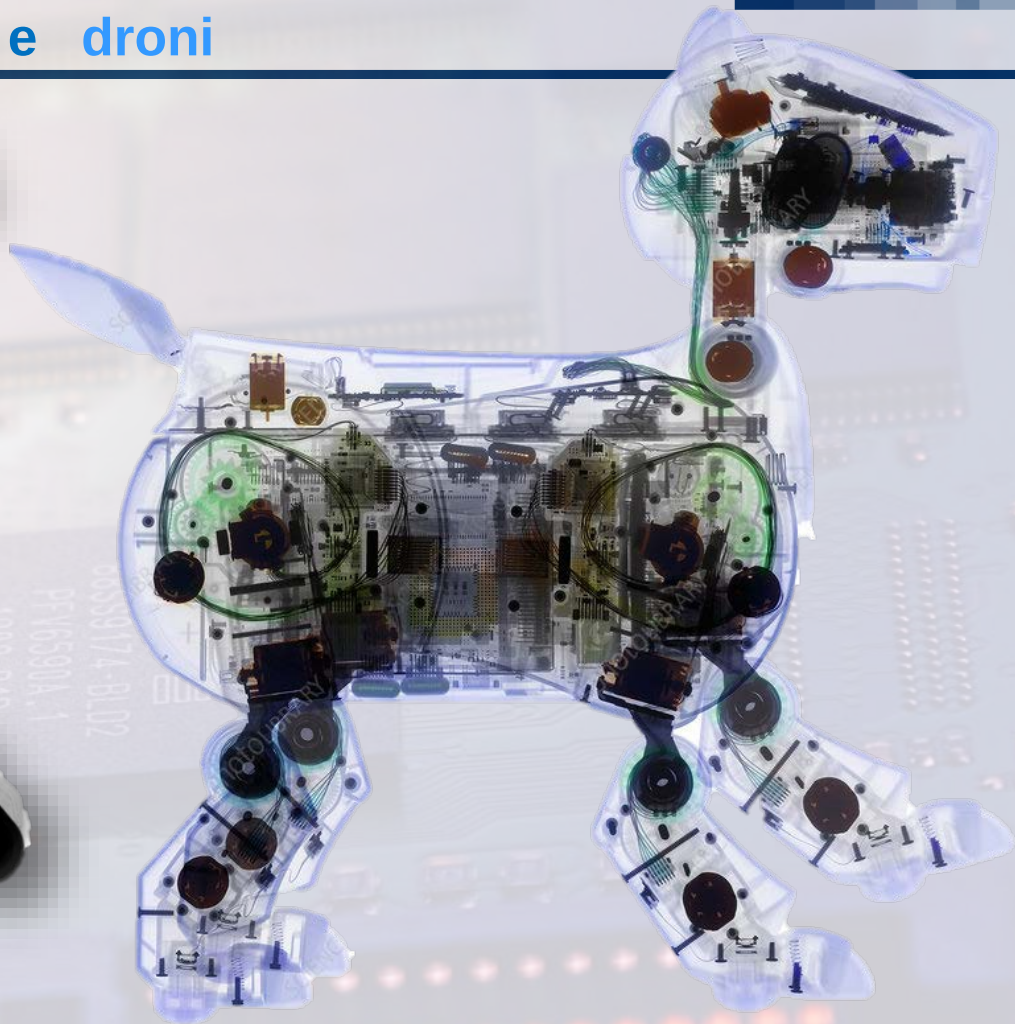
Crash sensors:

- Front protection adaptivity
- Side protection
- Rear impact protection



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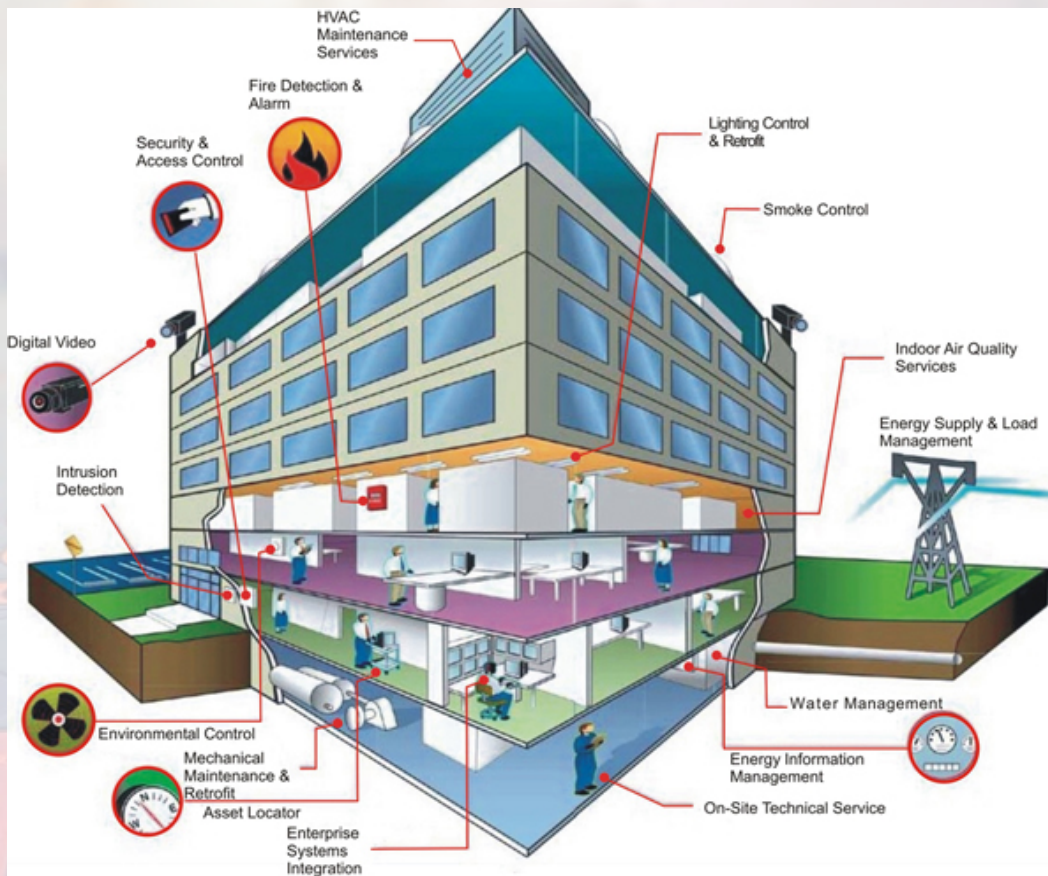
Elettronica per robotica e droni



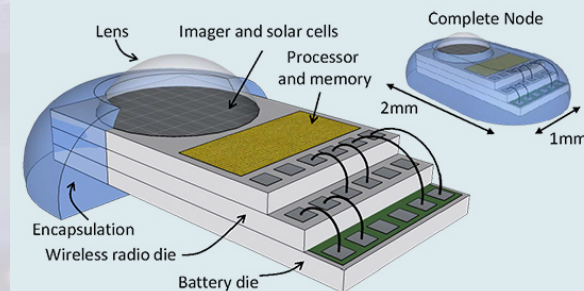
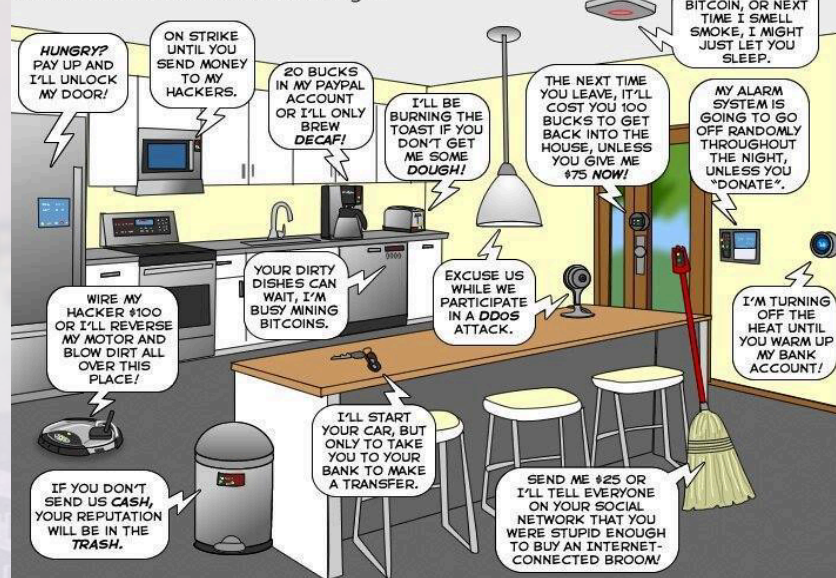


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Elettronica per *I_{nternet}O_fT_{hings}*, smartdust e home/building automation



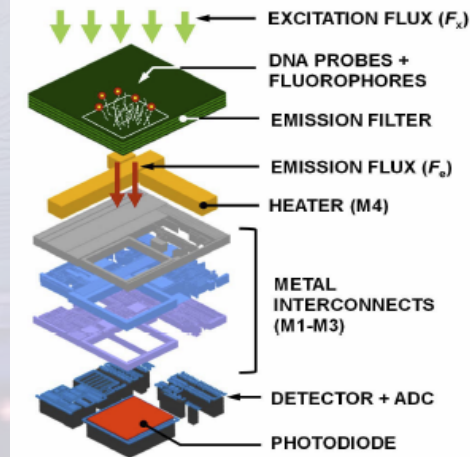
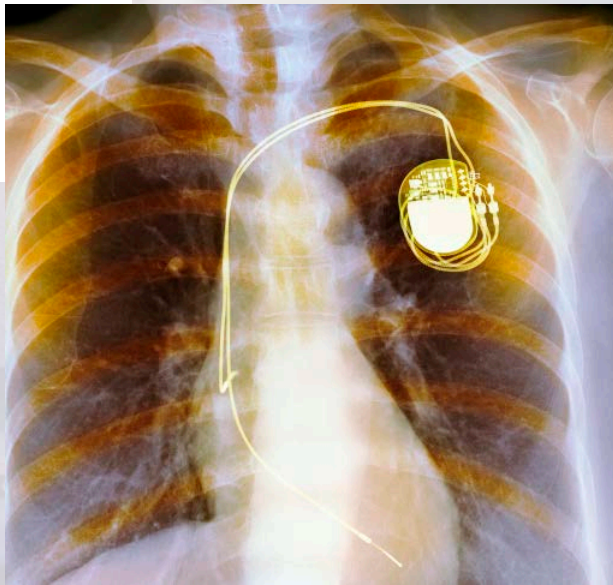
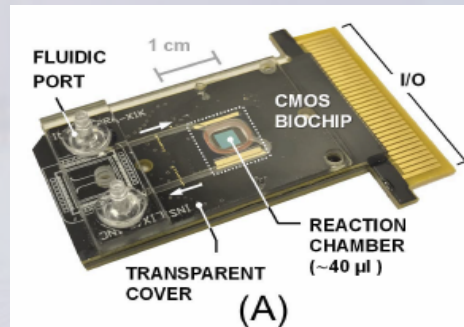
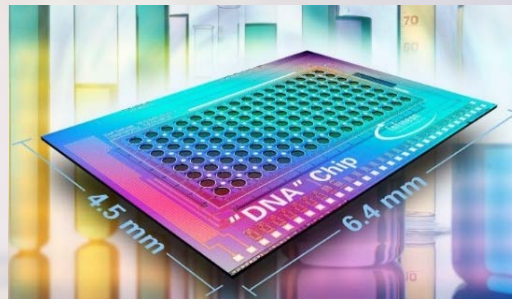
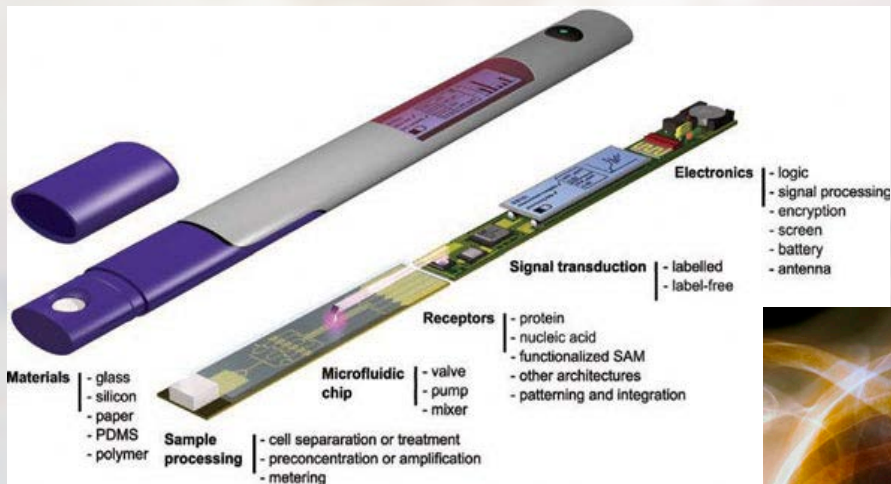
The Internet of ransomware things...





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Elettronica per biochip e medicina

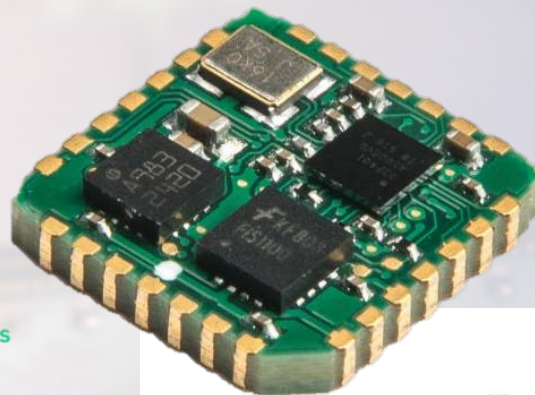
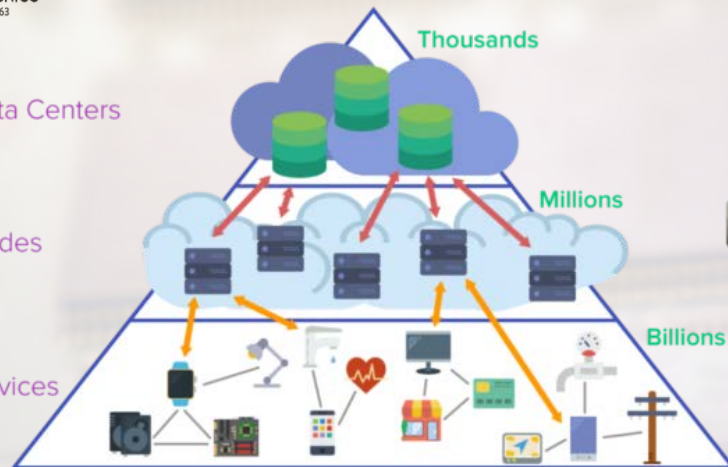




CLOUD | Data Centers

FOG | Nodes

EDGE | Devices



Question. $10.11 \times 9.8 = ?$

Conventional Computing

$$\begin{array}{r} 1.1 \\ 8.088 \\ + 90.99 \\ \hline 99.078 \end{array}$$



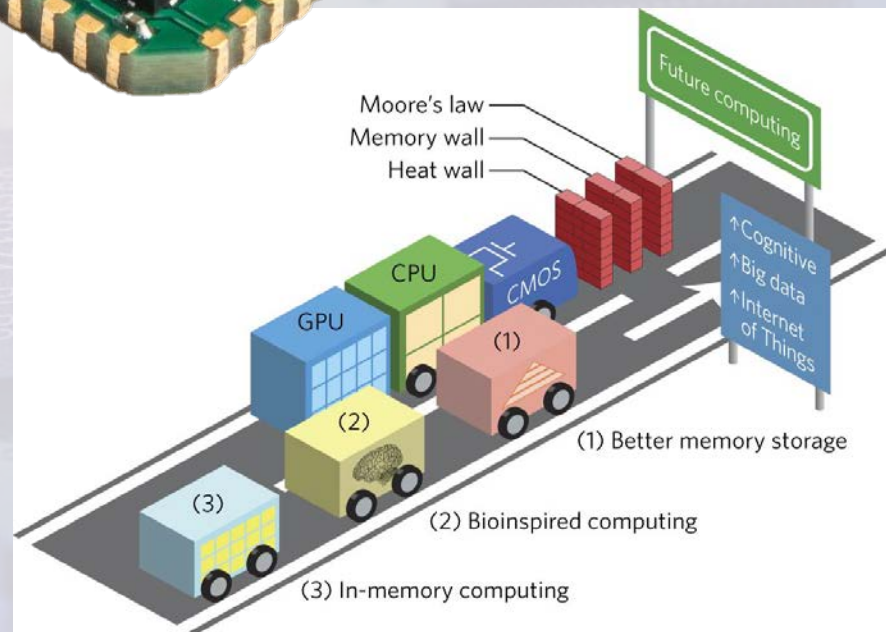
- Complicate
- Inefficient
- Slow

Approximate Computing

About
100?



- Simple
- Efficient
- Fast





Classical Bit

1 Bit



or

N Bit



Either 0 or 1

One out of 2^N possible permutations

Quantum Bit

1 Bit

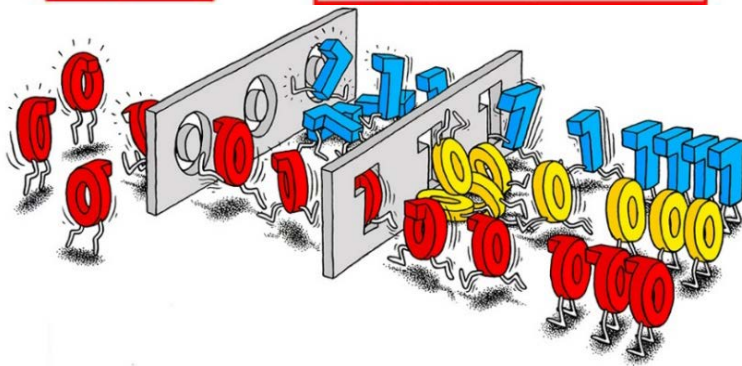


N Bit

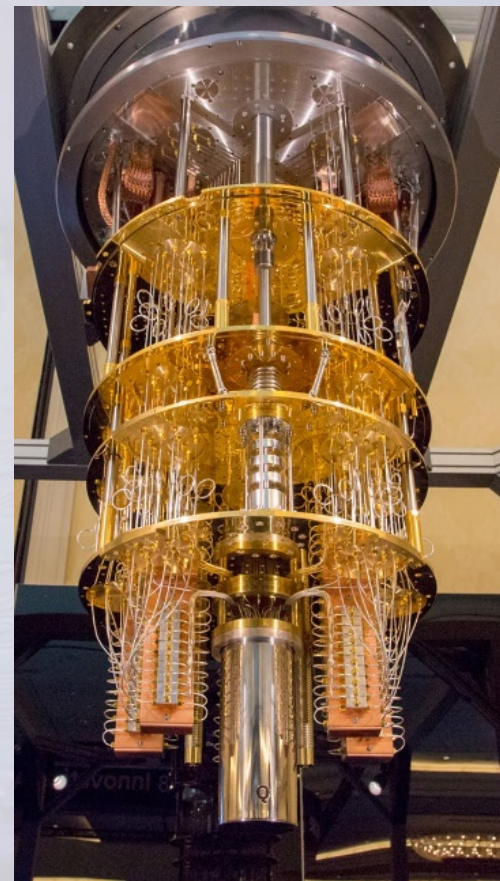


Both 0 and 1

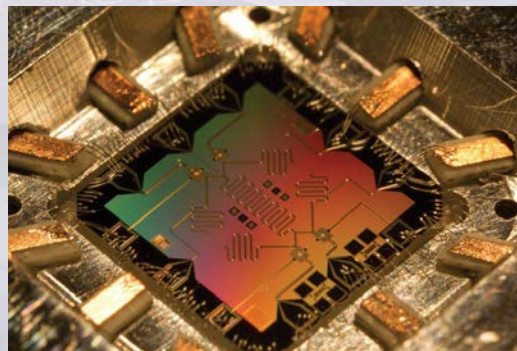
All of 2^N possible permutations



Google



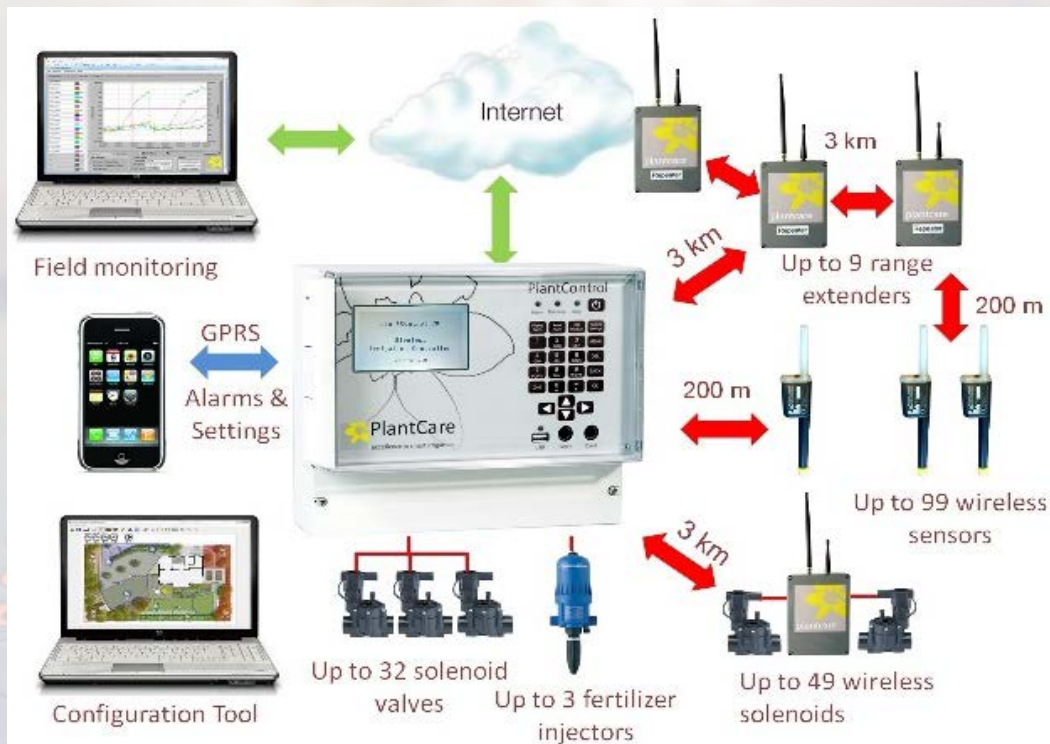
IBM





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Elettronica per *precision farming*





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Elettronica per science, physics, space

