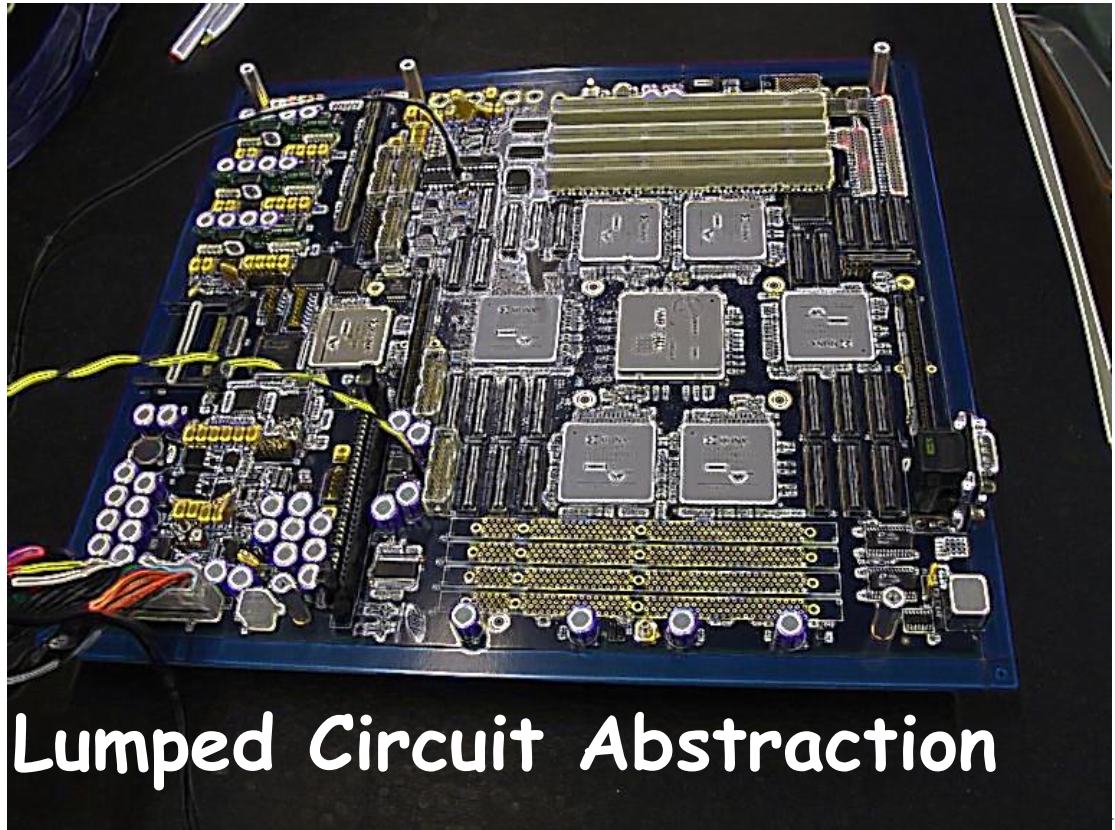


6.002x

CIRCUITS AND ELECTRONICS



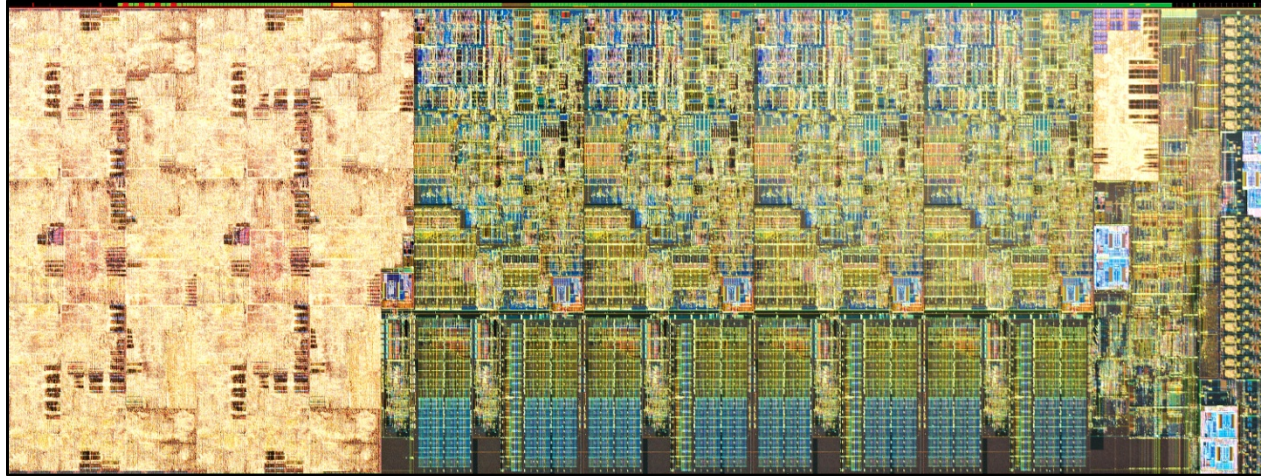
Introduction and Lumped Circuit Abstraction

6.002x is Exciting!



What's
behind this?

...and this



Chip photo of Intel's 22nm multicore processor codenamed Ivy Bridge

Photograph courtesy of Intel Corp.

What is engineering?

Purposeful use of science

What is 6.002x about?

Gainful employment of Maxwell's equations
From electrons to digital gates and op-amps

Nature as observed in experiments

| | | | | | | |
|---|---|---|-----|-----|-----|---|
| - | . | . | 4 | 3 | 2 | V |
| | | | 0.4 | 0.3 | 0.2 | I |

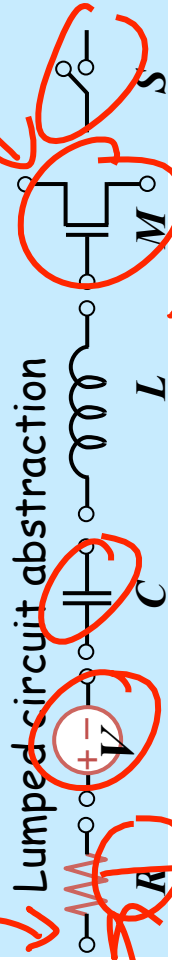
Physics laws or "abstractions"

- Maxwell's
- Ohm's

$$V = RI$$

abstraction for
tables of data

Lumped circuit abstraction



Simple amplifier abstraction



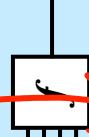
Operational
amplifier abstr.



Digital abstraction



Combinational logic



Clocked digital abstraction



Analog subsystems

Modulators,
oscillators,
RF amps,

power supplies

Mice, toasters, sonar, stereos, angry birds,
space shuttle, iPad

Software systems
systems, Browsers

Programming languages

Java, C++, Matlab, Python

Instruction set abstraction

Pentium, MIPS

15A

6.002x

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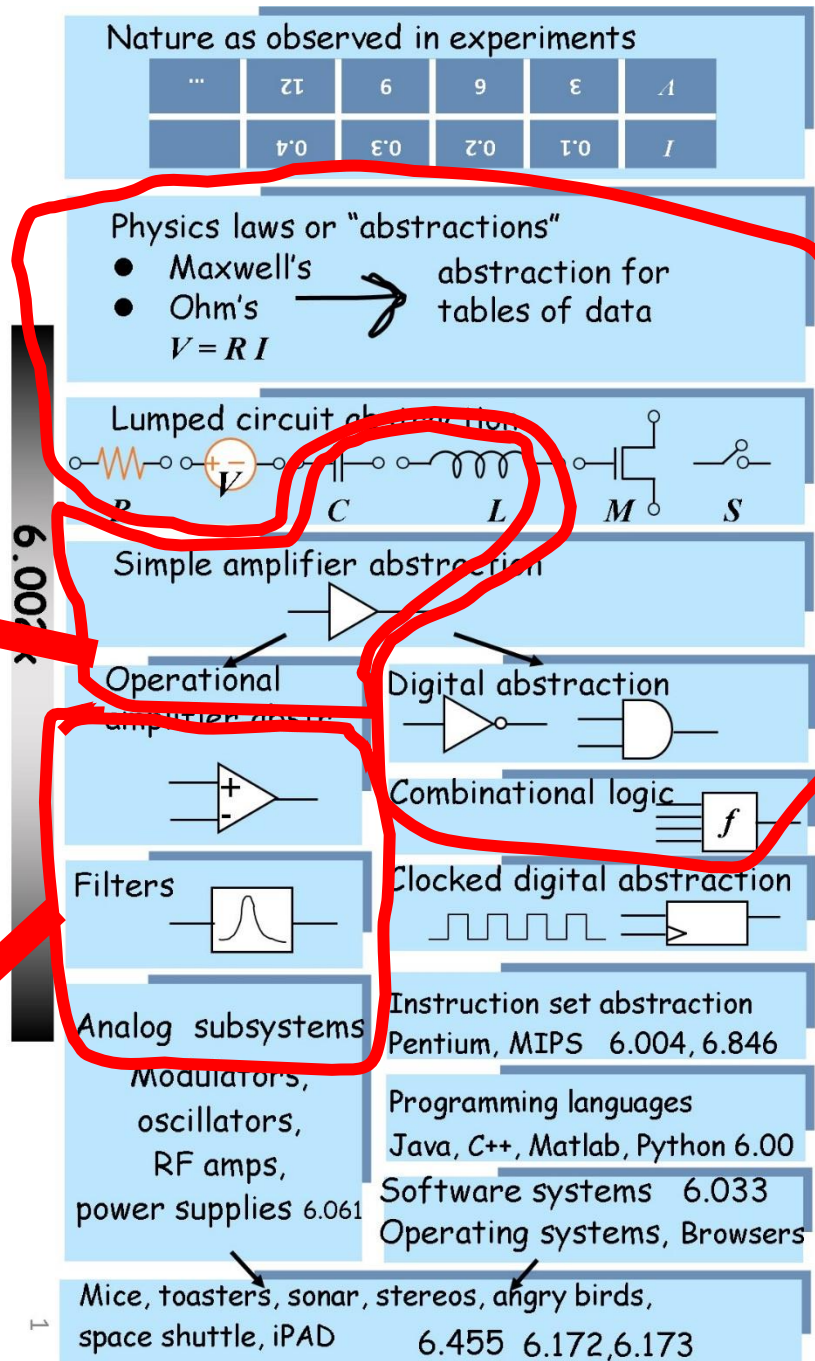
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6.002.2x
Circuits and Electronics 2

6.002.3x
Circuits and Electronics 3



6.002.1x
Circuits and Electronics 1