



INF3410 — Fall 2014

Why take this course?



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content

Why Analog

Amplifiers

Course Organization



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The world is analog

Analog electronics for sensor/actuator interfaces

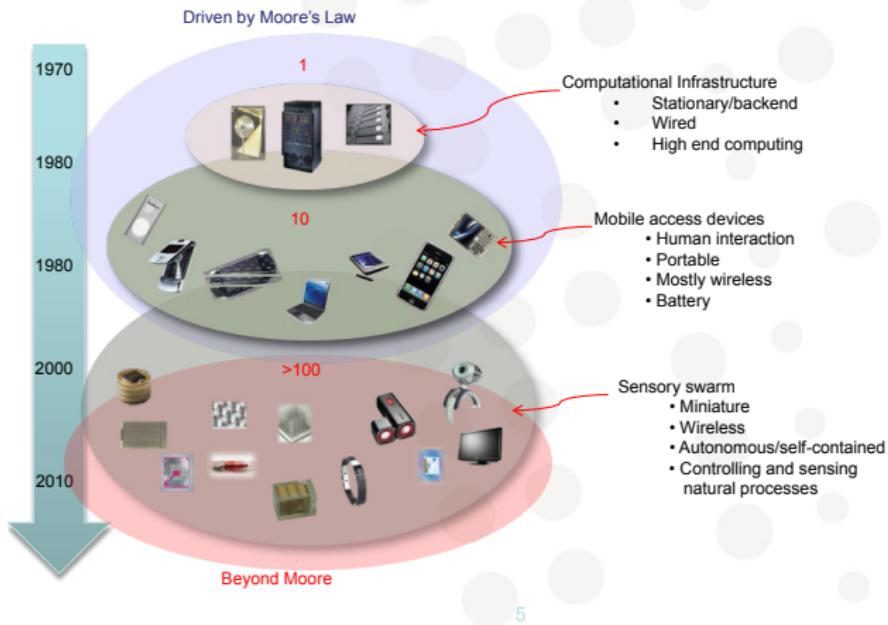


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Ubiquitous Sensors Interfaces

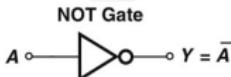
Trend to 'Cyberphysical Systems'



Even Computers are Analog ;-)

Where the digital abstraction breaks down

- Gates

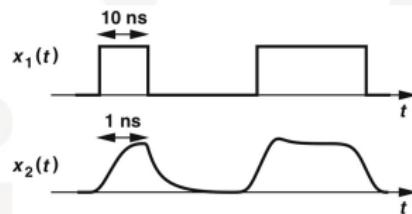
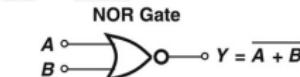


- Increasing speed

- Why this degradation?
- How do we improve performance?
- Digital → analog
 - Going for speed...

100MHz

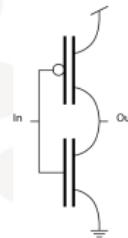
1GHz



- Noise/interference



- Where does this noise originate?
- How do we reduce this noise/interference?
- Digital → analog
 - When scaling down size and scaling up complexity



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Amplifiers

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Amplifiers: importance

- ▶ What a switch is for digital electronics, amplifiers are for analog electronics:
 - ▶ the most important active element. (A switch *is* an amplifier.)
 - ▶ an abstraction/simplification of a physical device.
- ▶ An amplifier is required where-ever electronics (or a biological organism) interfaces with the real world, mediating between sensors and actuators and processing circuitry. (The world is analog.)
- ▶ Maintaining signal energy in processing requires amplification.

Amplifiers: definition

An amplifier is a device that linearly/monotonically projects an input signal range to an output signal range, increasing power (usually) and optionally changing the signal representation (transducer).

Amplifiers: example



Amplifiers: more examples



Ubiquitous electronic amplifiers



CMOS Amplifiers

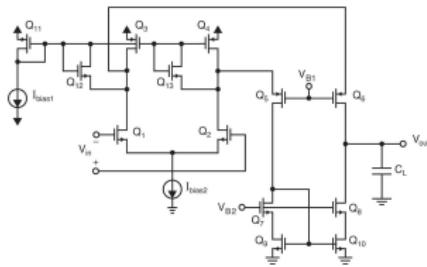
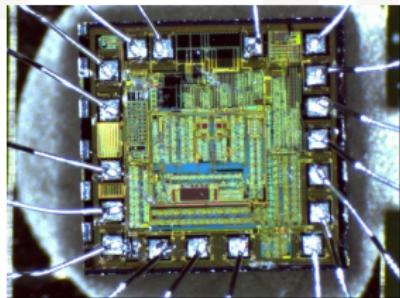
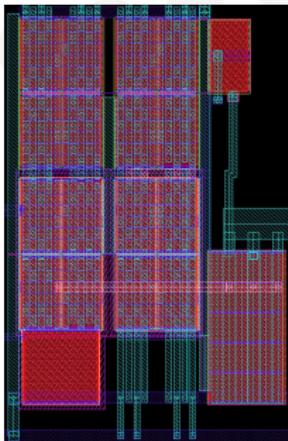
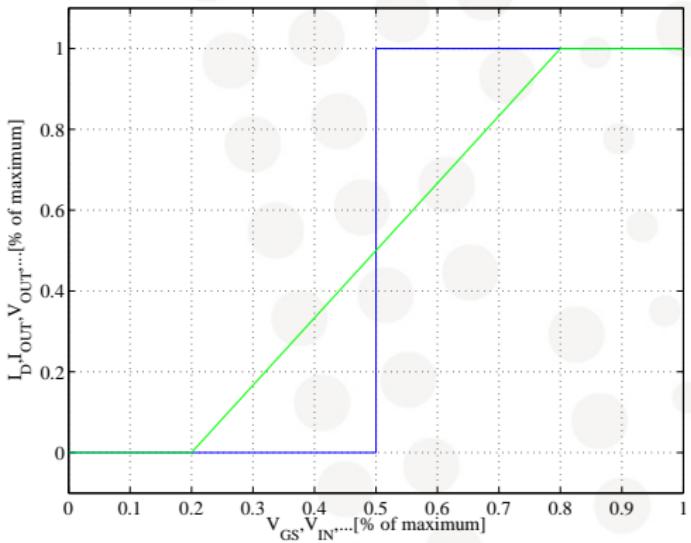


Figure 4.28
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Switch vs. Amplifier



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Teaching 15 lectures (Fridays 10-12), lecture foils,
book: 'analog integrated circuit design',
selected papers

Labs 3 tasks (counting 40% towards final mark,
task 1 is only pass/not pass, Joar Særsten),
workgroups with up to 3 students

Paper exercises 12 exercises in preparation for exam
(Wednesdays 10-12, Ali Dadashi)

Tools Cadence, matlab, solder iron, lab equipment

Skills electronics, maths, physics, programming

Exam written exam, counting 60% towards final
mark, early in December