

Introduction to Computer Engineering – EECS 203
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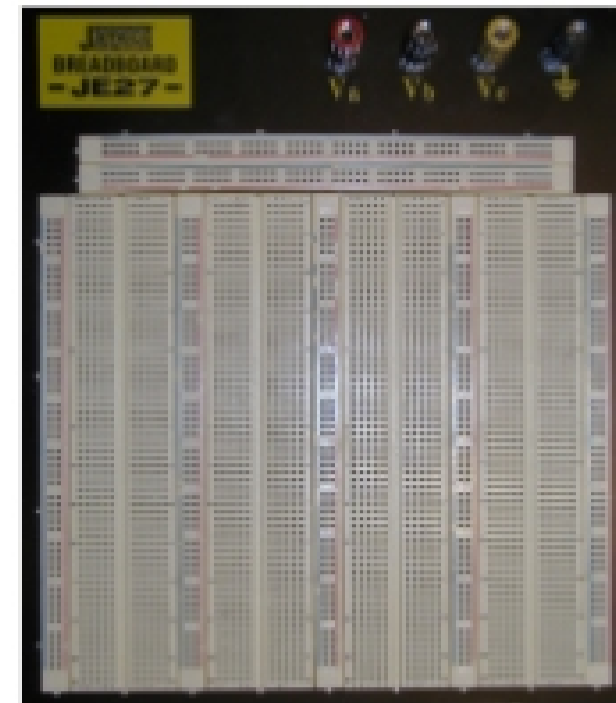
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Lab tutorial
Computer geek culture

Breadboard



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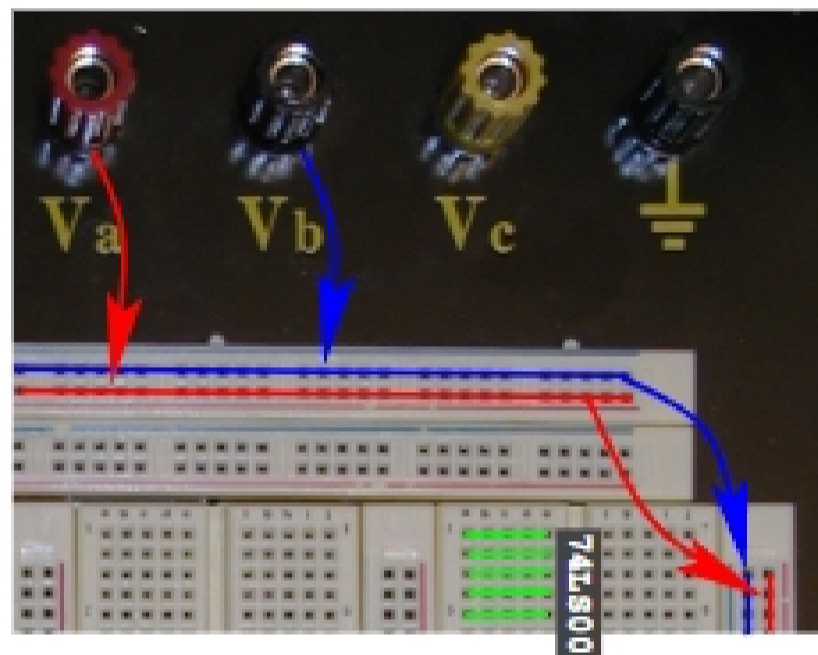
Logic probe



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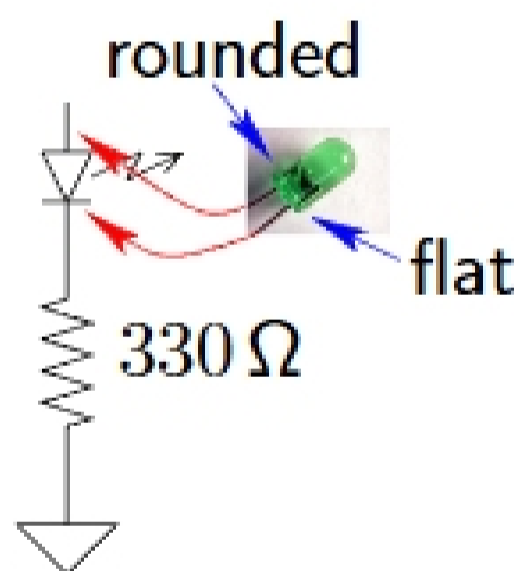
Resistors

- Color code sheet in your orange box
- Colored bands indicate numbers
- Black (0), brown (1), red (2), orange (3), yellow (4), etc.
- What is Orange, Orange, Black?
- What about Orange, Orange, Brown?

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Light emitting diodes (LEDs)



Never drive an LED without a series current-limiting resistor!

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Guidelines

- Connect all inputs to some signal, best not to rely on floating
 - Good practice for CMOS, where it's essential
- Color-code wiring in complicated circuits
 - Learn how to strip wire
- Don't cross wire over chips
- Double-check V_{DD} and V_{SS} wiring
- Watch for hot chips
- Use current-limiting resistors on LEDs

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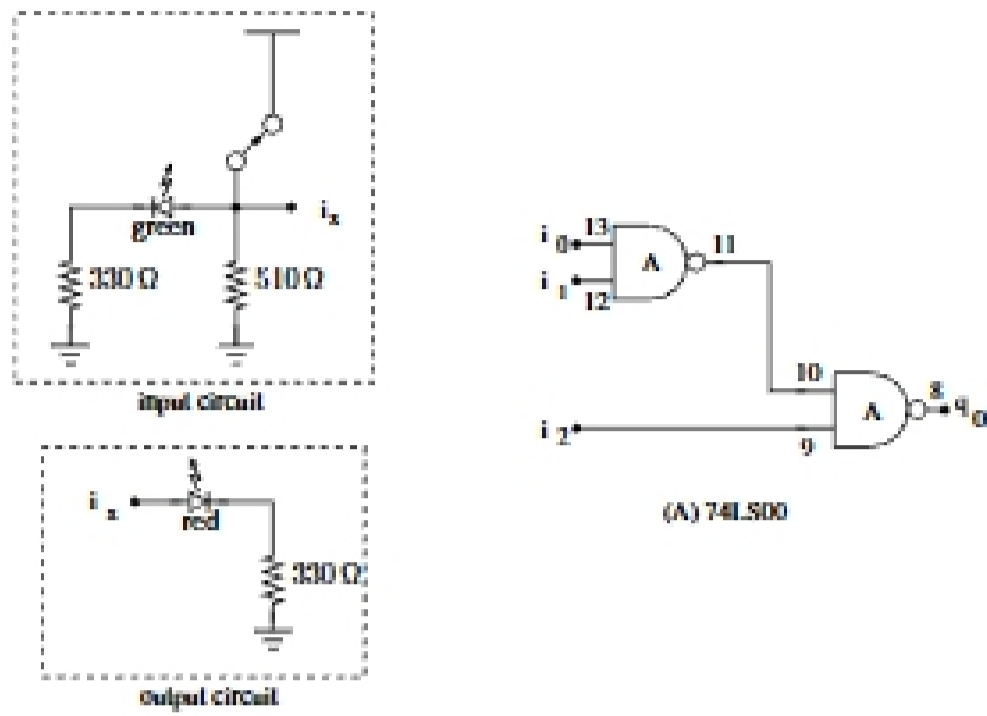
Transistor to transistor logic (TTL)

- Consumes more power than CMOS
- Generally more difficult to damage than CMOS (ESD)
- Inputs "float high"
- What does this imply?
- Why is it good for prototyping?

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Circuit diagram example



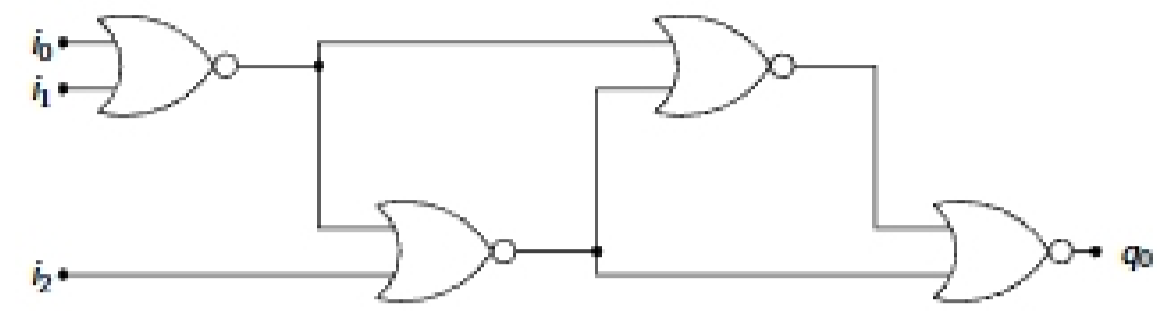
Summary

- Demo to put prototyping in context
- Breadboarding lecture and demo

Computer geek culture references

- <http://www.digikey.com>
- <http://www.mouser.com>
- <http://www.jameco.com>

Incomplete circuit diagram example



Prototyping trends

- Surface mount
- FPGAs
- Virtual prototyping