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# EECS 16A Touchscreen 1

**\*\*Insert your names here\*\***

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# Semester Outline



Imaging  
Module



Touchscreen  
Module



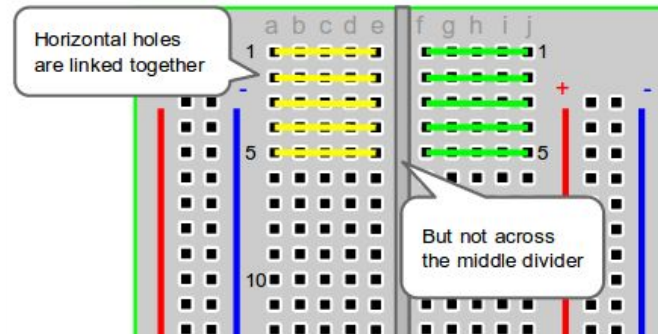
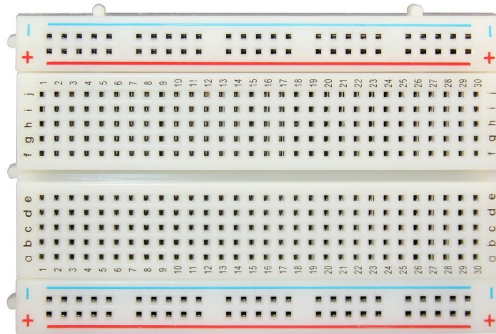
Acoustic  
Positioning  
Module

# Today's lab:

- Breadboarding
- Build multiple functional circuits
- Learn how to use Multimeter

# Breadboarding basics

- Similar to Imaging 1: Intro to Breadboarding
- Build up breadboarding skills
  - Connect to concepts in lecture, including Voltage Dividers and KVL
- Very important skill: prototype, debug, and translate theoretical ideas into real circuits



# Poll time!

Review of breadboarding practices from Imaging 1.

1. Which of the following are good breadboarding practices?
  - a. Check the resistor value by its color bands
  - b. Plug in component legs in different rows
  - c. Use black and red wires for the rails

2. For which of the following components does polarity matter?

Resistor

LED

Capacitor

Ambient Light Sensor

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Resistor

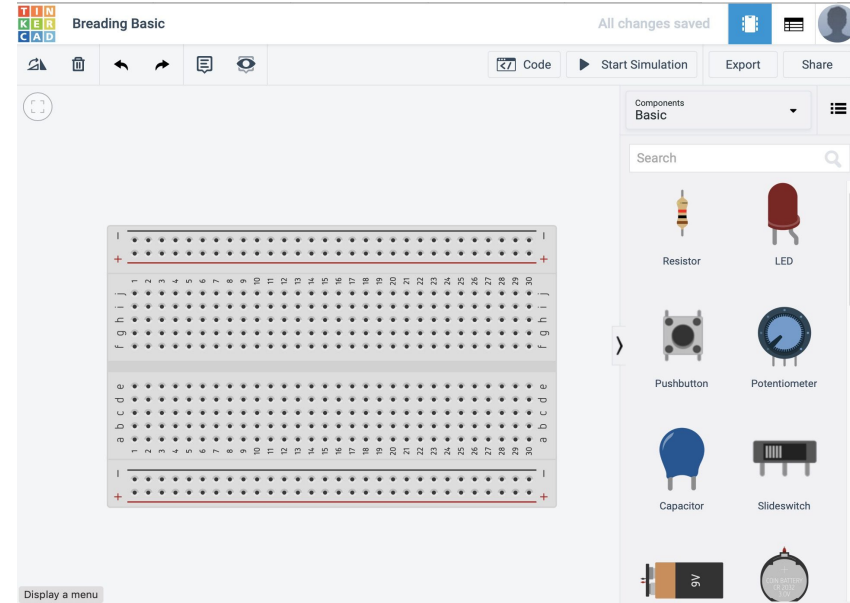
LED

Capacitor

Ambient Light Sensor

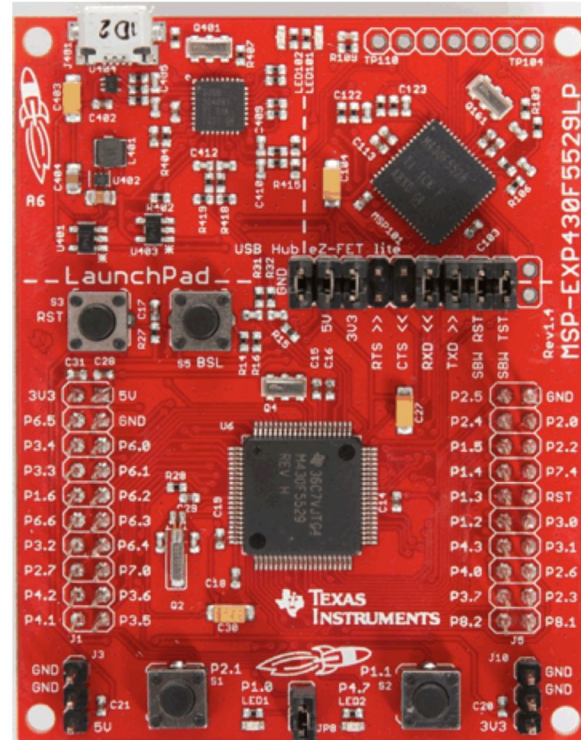
# TinkerCAD

- Circuit design prototyping software
  - Primary circuit software in this course
  - Useful for many different electrical projects
  
- Run online using an Autodesk account



# Launchpad Review

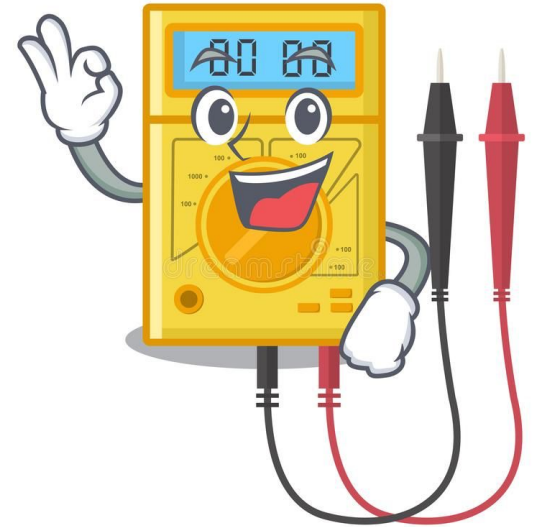
- Micro-Controller
- Power Supply
- Voltmeter





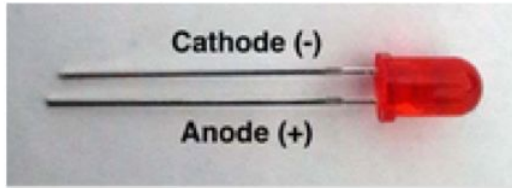
# Multimeter (Circuit Debugger)

- Voltmeter
  - Infinite resistance
  - Connect in parallel with component
- Ammeter
  - Very low resistance
  - Act as a wire in the circuit
  - Connect in series with component
- Ohmmeter
  - Remove resistor from circuit before use
  - Connect in parallel with resistor



# Circuit Elements

LED



0.5 V



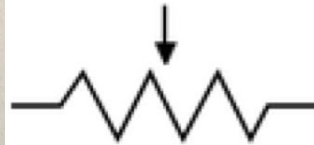
0.6 V



0.7 V



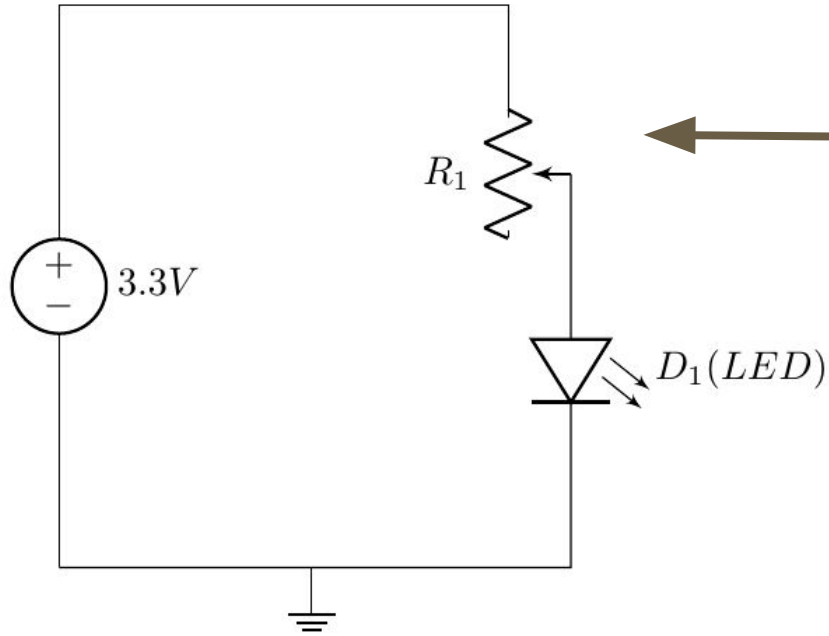
Potentiometer



# Circuit Elements: Terminology Update

- **Moving forward, we'll be using "pin" and "socket" to replace "male" and "female" (respectively) in the context of wiring and components**
- Note that the terms "male" and "female" remain the industry standard, so keep that in mind when ordering parts or reading documentation!

# LED Fader Circuit



# Voltage Divider Circuit

What is the voltage value  $u_2$  at Node 2?

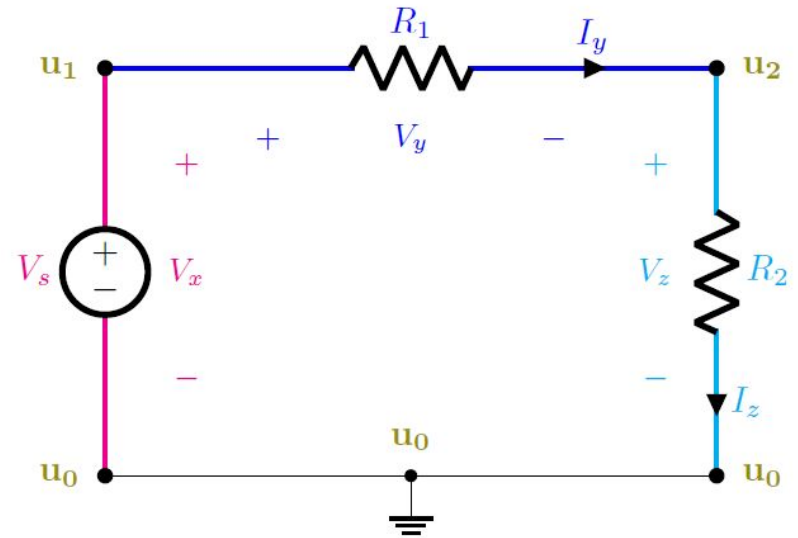
$$I_y = I_z = V_s / (R_1 + R_2) \text{ (Ohm's Law)}$$

$$u_2 - u_0 = R_2 * I_z$$

$$u_2 - 0 = R_2 * V_s / (R_1 + R_2)$$

$$u_2 = V_s * R_2 / (R_1 + R_2)$$

What is the voltage value  $u_2$  if  $R_1$  equals to  $R_2$ ?



# Pointers

- Try to debug your circuit by yourself before you ask the TAs
  - However, don't spend too long, after 5 minutes or so ask for help
- Current Limit = 0.1 A
- Voltage = 3.3V