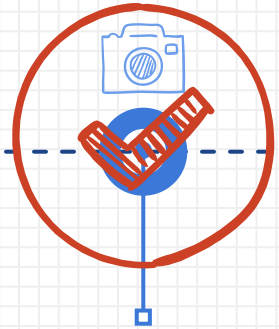
EECS16A Touchscreen 1

Semester Outline



Imaging Module

Touchscreen Module

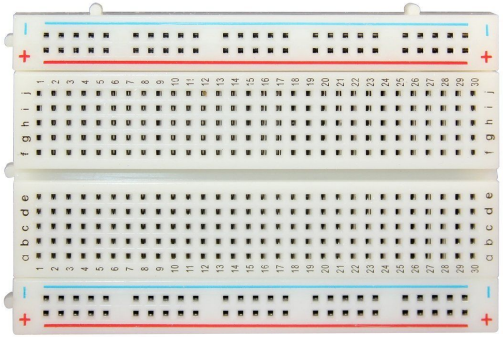
APS Module

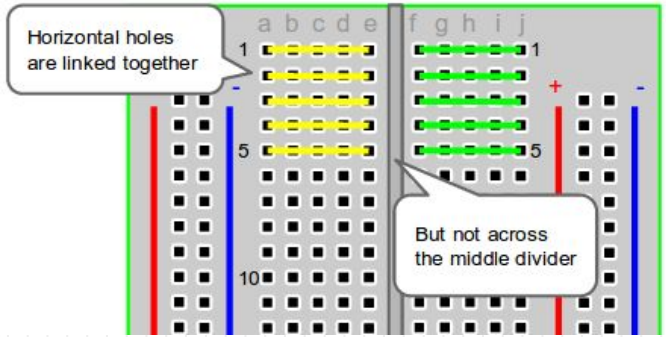
Today’s lab:

- 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

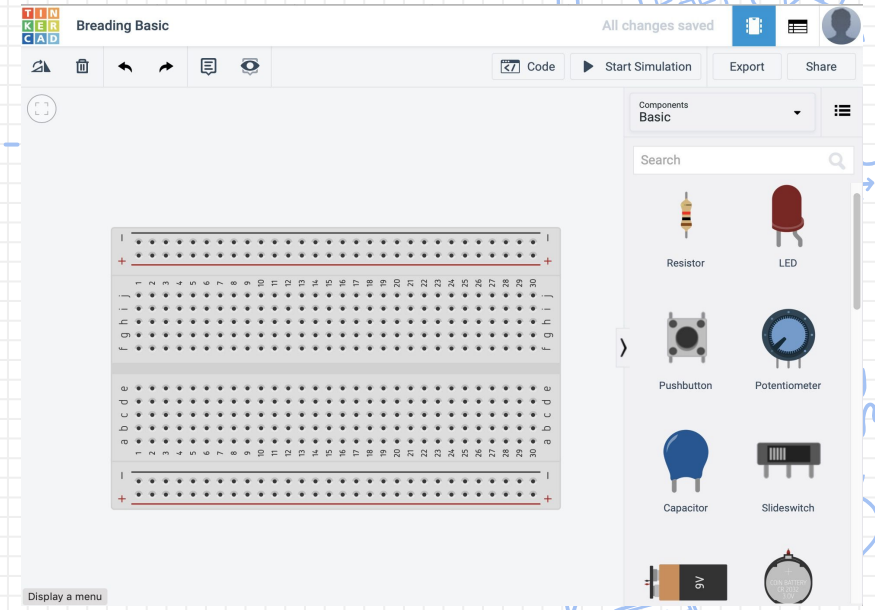




Tinkercad

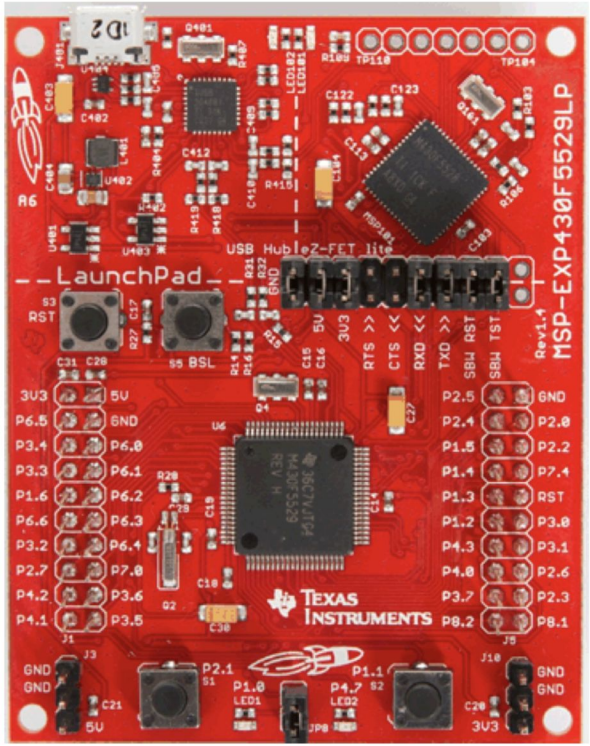
- Circuit design prototyping software
  - Primary circuit software in this course
  - Useful for many different electrical projects

- Ran online using an Autodesk account



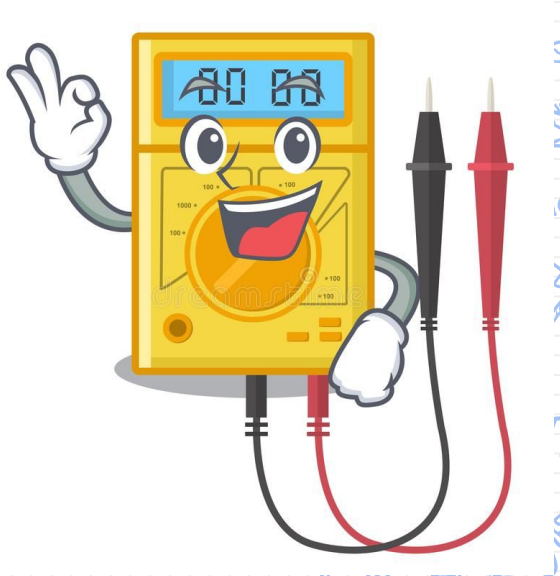
Launchpad Review

- Micro-Controller
- Power Supply
- Voltmeter



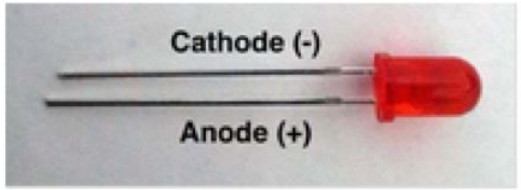
Multimeter (Circuit Debugger)

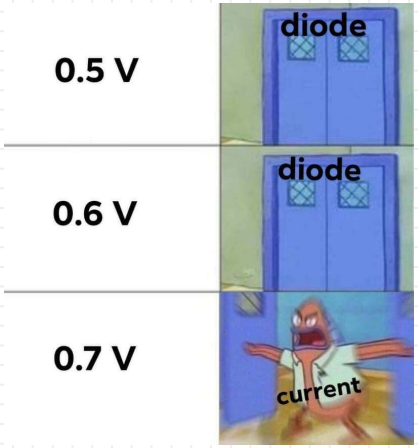
- Voltmeter
  - Infinite resistance
  - Connect in parallel with component
- Ammeter
  - Very low resistance
  - Act as a wire in the circuit
  - Connect in series with component
- Ohmmeter
  - Remove resistor from circuit before use
  - Connect in parallel with resistor



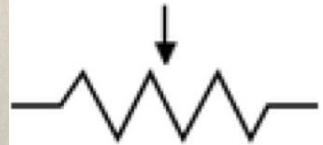
Circuit Elements

LED

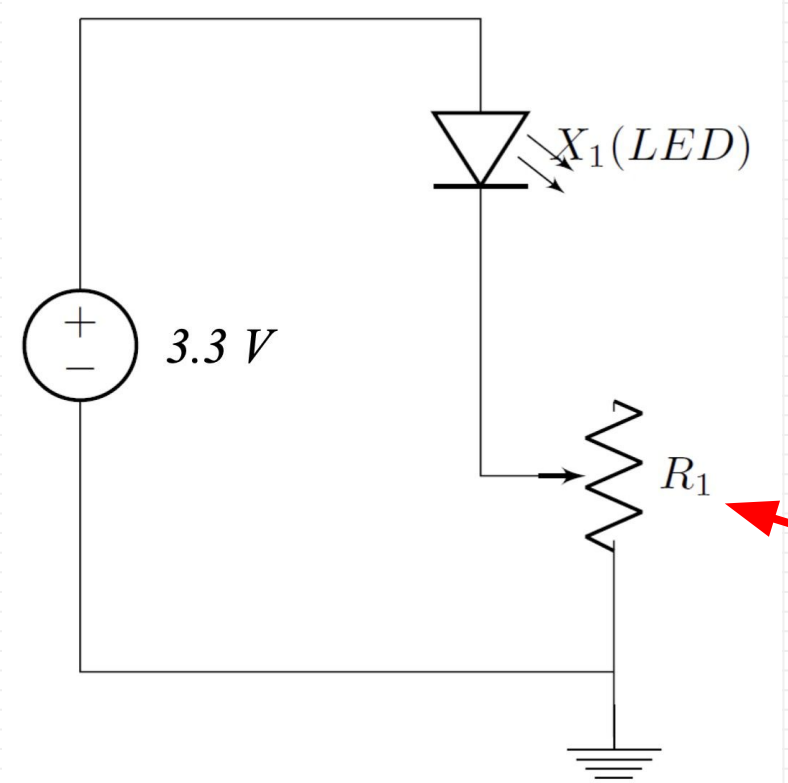




Potentiometer



LED Fader Circuit



Voltage Divider Circuit

What is the voltage value u_2 at Node 2?

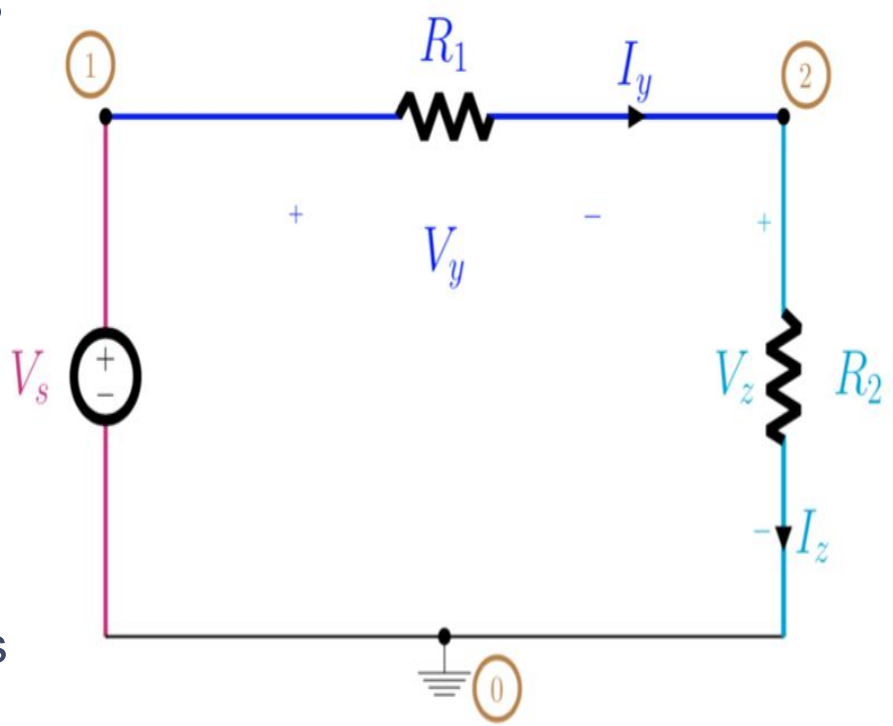
$$I_y = I_z = V_s /(R_1 + R_2)\ (Ohm's\ Law)$$

$$u_2 - u_0 = R_2 * I_z$$

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

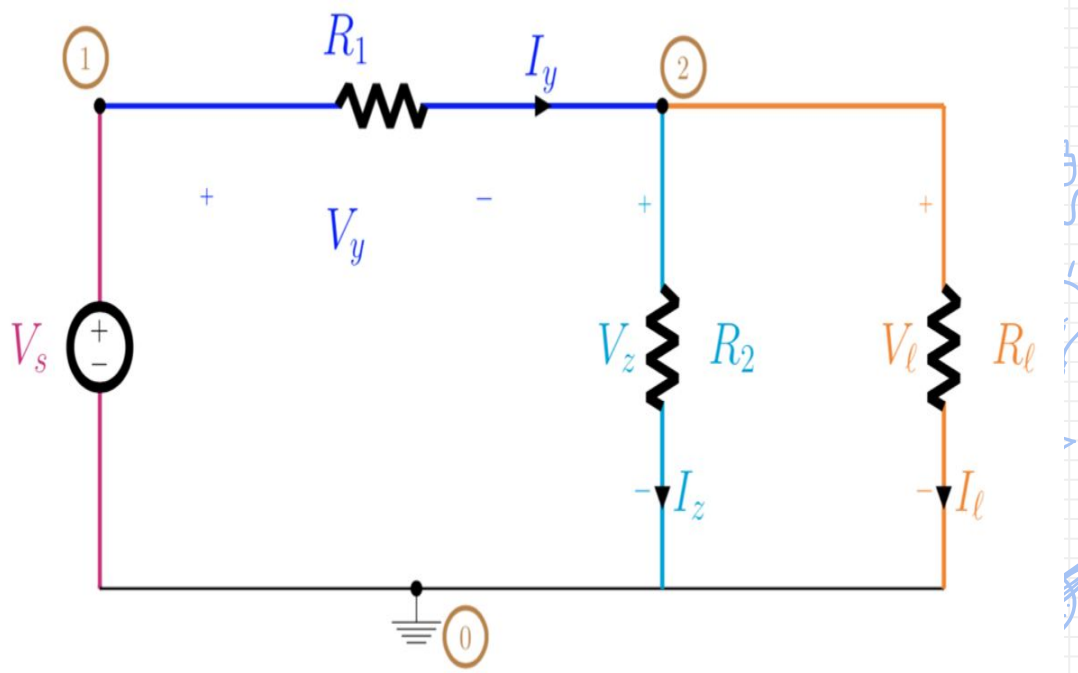
$$u_2 = V_s * R_2 /(R_1 + R_2)$$

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



Series and Parallel Resistors

- What is the relationship between R_2 and R_l?
- What about R_1 with R_2 and R_l?



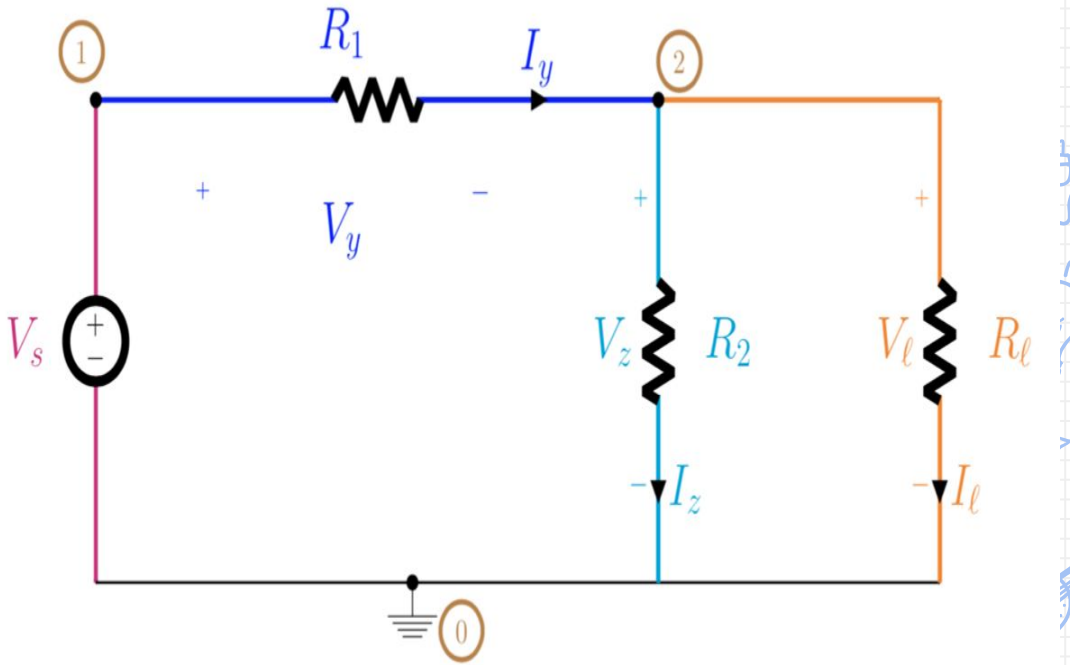
Series and Parallel Resistors

Resistor Equation:

$$R = (\rho * L) / A$$

When in parallel what parameter changes? How does this affect overall resistance, (ie: R_{eq})

What about in series?



Pointers

- Go through the TinkerCAD tutorial
- Lab Structure:
  - Build in TinkerCAD & Simulate
  - Build on Breadboard and confirm
- Try to debug your circuit by yourself before you ask the TAs
  - However, don’t spend too long, after 5 minutes or so queue for help
- Task 3c: MSP acts as single point voltmeter