EECS 16A Touchscreen 1

**Insert your names here**
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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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

Potentiometer
LED Fader Circuit

3.3 V

$X_1(LED)$

$R_1$
Voltage Divider Circuit

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

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

$u_2 - u_0 = R_2 \cdot I_z$

$u_2 - 0 = R_2 \cdot \frac{V_s}{(R_1 + R_2)}$

$u_2 = \frac{V_s \cdot R_2}{(R_1 + R_2)}$

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

- Tasks are labelled Software or Hardware else Software in the title
- For students with hardware:
  - Some TinkerCAD tasks
  - Some hardware tasks
- For students without hardware:
  - Do the TinkerCAD versions of all tasks
  - Watch videos and work with group members to see hardware setup
- Optional Task 4 at the end of the notebook to try building more circuits
Pointers

- Go through the TinkerCAD tutorial (if you haven’t already)

- 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: Launchpad acts as single point voltmeter