EE16A Imaging 1

You must use a lab station computer!
Waitlisted / EECS47D wait by round table
IMPORTANT: WAITLIST POLICY

If lab is full, we will kick out all waitlisted folks.

If full: We will check CalCentral enrollment after the presentation.
Why?

- Imaging 1:
  - Finding a link between physical quantities and voltage is powerful
  - If you can digitize it, you can do anything (IOT devices, internet, code, processing)
Today’s Lab: Imaging Part 1

✘ Distribute materials (TI MSP430F5529)
✘ Bring your kit every week
✘ Breadboarding 101
✘ Build circuit that reacts to light intensity
✘ Use Oscilloscope and MSP430 to see how the circuit behaves
✘ Graded checkoff starts today!
Light-detecting Circuit

3.3V

Ambient Light Sensor

100 kΩ  1 µF
Simple Circuit

✗ Components
✗ Resistors
✗ Capacitors
✗ Voltage Source
✗ Wires / Jumpers [male-to-male vs male-to-female]
What's in your bag? : Resistors
# Resistors

What's in your bag?: Resistors

## 4 Band Resistor Color Coding

<table>
<thead>
<tr>
<th>COLOR</th>
<th>1ST BAND</th>
<th>2ND BAND</th>
<th>MULTIPLIER</th>
<th>TOLERANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLACK</td>
<td>0</td>
<td>0</td>
<td>x1Ω</td>
<td>±1%</td>
</tr>
<tr>
<td>BROWN</td>
<td>1</td>
<td>1</td>
<td>x10Ω</td>
<td>±1%</td>
</tr>
<tr>
<td>RED</td>
<td>2</td>
<td>2</td>
<td>x100Ω</td>
<td>±2%</td>
</tr>
<tr>
<td>ORANGE</td>
<td>3</td>
<td>3</td>
<td>x1000Ω</td>
<td>±2%</td>
</tr>
<tr>
<td>YELLOW</td>
<td>4</td>
<td>4</td>
<td>x10000Ω</td>
<td>±2%</td>
</tr>
<tr>
<td>GREEN</td>
<td>5</td>
<td>5</td>
<td>x100000Ω</td>
<td>±0.5%</td>
</tr>
<tr>
<td>BLUE</td>
<td>6</td>
<td>6</td>
<td>x1000000Ω</td>
<td>±0.25</td>
</tr>
<tr>
<td>VIOLET</td>
<td>7</td>
<td>7</td>
<td>x10000000Ω</td>
<td>±0.10</td>
</tr>
<tr>
<td>GREY</td>
<td>8</td>
<td>8</td>
<td></td>
<td>±0.05</td>
</tr>
<tr>
<td>WHITE</td>
<td>9</td>
<td>9</td>
<td></td>
<td>±0.05</td>
</tr>
<tr>
<td>GOLD</td>
<td></td>
<td></td>
<td>0.1</td>
<td>±5%</td>
</tr>
<tr>
<td>SILVER</td>
<td></td>
<td></td>
<td>0.01</td>
<td>±10%</td>
</tr>
</tbody>
</table>
Equipment for Today: Capacitors
Equipment for Today: Wires/Jumpers
Equipment for Today: Voltage Source (0.1 A Limit)
Simple Circuit

✘ Components
✘ Nodes
✘ Point in circuit where circuit elements meet
✘ Wire between components are considered part of one node
✘ We know you don’t know much about circuits yet; we’ve given you very detailed instructions on how to build the circuit in the lab
Simple Circuit

- Components (Resistors, LEDs, Capacitors)
- Nodes
  - Point in circuit where circuit elements meet
  - Wire between components are considered part of one node

What components?
How many nodes?
Where are these nodes?
Simple Circuit

✘ Components (Resistors, LEDs, Capacitors)
✘ Nodes
✘ Point in circuit where circuit elements meet
✘ Wire between components are considered part of one node

What components?
Resistor, Voltage source

How many nodes? 2

Where are these nodes?
**Simple Circuit**

- **Components** (Resistors, LEDs, Capacitors)
- **Nodes**
  - Point in circuit where circuit elements meet
  - Wire between components are considered part of one node

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What components?  
How many nodes?  
Where are these nodes?
Simple Circuit

✗ Components (Resistors, LEDs, Capacitors)
✗ Nodes
✗ Point in circuit where circuit elements meet
✗ Wire between components are considered part of one node

What components?  
How many nodes? 3  
Where are these nodes?
Breadboard
Horizontal holes are linked together.

But not across the middle divider.
Light-detecting Circuit

- Ambient Light Sensor
- 3.3V
- 100 kΩ
- 1 μF
Begin!

✘ Please use the station desktops for this lab.

✘ This week’s lab is listed as “Imaging Lab 1”
FAQ

✘ UNZIP the downloaded file before doing anything – ask us if you have questions
✘ SHIFT+RIGHT CLICK on a folder window to open in CMD
  ✘ ‘ipython notebook’ to open ipython notebook
  ✘ Let us know IMMEDIATELY if you’re having trouble with this
✘ Never have the output of the voltage source on while you are moving things around
✘ Probes are in the back
✘ Make sure you are using the right resistor (Brown Black Gold) – get at TA desk
✘ Make sure your Phototransistor is the right direction
✘ DO NOT MESS WITH THE INSTALL – DO NOT PIP INSTALL ANYTHING
✘ Complete the lab in PAIRS, do ONE setup per group