Goal:
Simulate a one way traffic light with a pedestrian crosswalk

Tasks:
- Create a constant cycle of green, yellow, and red lights (as LEDs), with a shorter yellow
- Allow a pedestrian to interrupt a green light (by covering a photoresistor) and go to red, without skipping the yellow
- Once the light is red and a pedestrian is there, the light must remain red and a buzzer should chirp as long as there are pedestrians waiting to cross
- After the pedestrians have crossed, the green-yellow-red cycle should continue as normal

Key Ideas:
- Use capacitors to store an analog state for timing
- Use comparators to convert that analog state into a digital state for precise output behaviors
State Circuits

Light Detector Circuit

Green State Circuit

Yellow State Circuit

Red State Circuit
Output Circuits and Behavior

<table>
<thead>
<tr>
<th>Desired Behavior</th>
<th>$C_1$</th>
<th>$C_2$</th>
<th>$C_3$</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Charge green, discharge yellow</td>
</tr>
<tr>
<td>Yellow</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>Charge yellow capacitor</td>
</tr>
<tr>
<td>Red</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Charge red capacitor</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Discharge green quickly</td>
</tr>
</tbody>
</table>

Green LED Circuit

Yellow LED Circuit

Red LED Circuit

Buzzer Circuit

Dave Jacobs, Chih Wu, Adarsh Uppula
Buzzer and Miscellaneous Circuits

Buzzer Wave Generator

Switch Wave Generator

Buzzer Amplifier (optional)

4.5V Power Supply

Dave Jacobs, Chih Wu, Adarsh Uppula