

LED Testing Report Team 14418

The testing was completed 11/23/2013.

Goal

The goal of the testing was to determine if it is necessary to use logic and/or op amps to turn LEDs on at certain voltages. Simpler designs were brainstormed that would only include resistors. The testing will test 1 LED at a time with 1 resistor in series to determine how it will react to changes in input voltage. Only the purely resistive circuit needs to be tested as the op-amp circuit has been proven to work by team 14317. However, the op amp circuit schematic is also shown for comparison.

Resistor design:

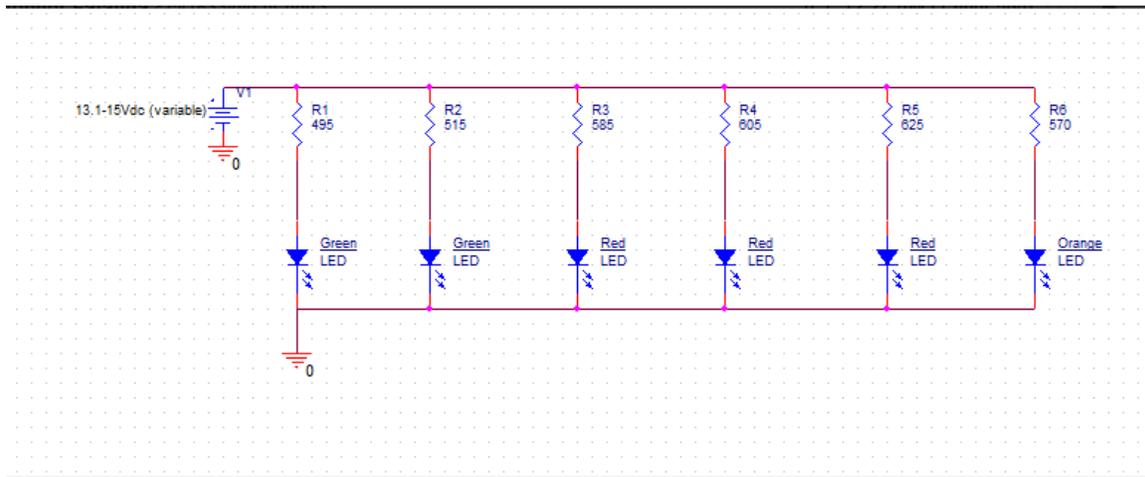


Figure 1: Resistor only design.

The resistor only design shown in figure 1 was designed so the resistor values were picked such that the LED in series will not theoretically turn on until the voltage reaches a certain value. This design was proven not to work in testing and will be explained more below.

Op-amp/Logic design:

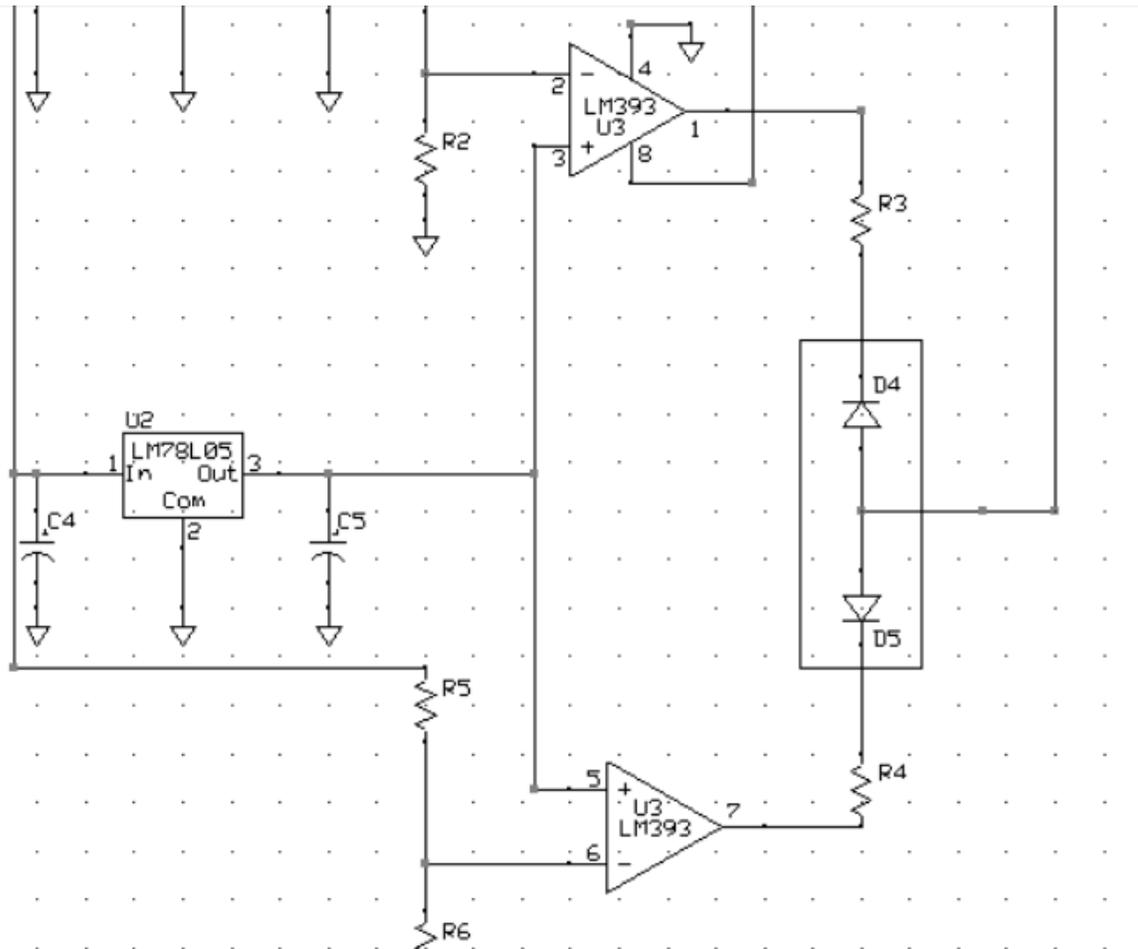


Figure 2: Preliminary design offered by Team 14317.

Seen in figure 2 is the op amp design that uses ICs to provide the LEDs with a high or low depending on the voltage of the system. This design was “half assed” (the technical term) by the previous team and will need to be heavily modified, but this is a good starting schematic.

Step by step report of testing the Resistor only design

1st Test: Green LED with 500Ω resistor in series and a variable input voltage.

- 1) 3V input is applied to the circuit.
- 2) LED turns on.
- 3) Voltage over resistor is ~.7V while voltage over LED is ~2.3V.
- 4) Input voltage is increased to 20V.
- 5) LED becomes much brighter.
- 6) Voltage over resistor is ~18.4V, voltage over LED is ~2.6V.

2nd Test: Red LED with 500Ω resistor in series and a variable input voltage.

-Similar results to previous test

Upon testing the resistor-only concept, it was determined that the designer was ignorant to the functioning of LEDs and it can be concluded that the circuit will not function as intended. A circuit with Op-amps and resistors must be used.