ECE 476/676 - Homework #3

Binary Outputs, Binary Inputs - Due Monday, September 15th

Transistor Switch

1) Write a Python program which turns on

- GP16 (LED), and
- GP18 (not used at present)

when button GP15 is pressed, and turns these pins off when GP15 is released.

Collect data to verify your Python program is working correctly.

2) The Star LED in your lab kit is a 1W LED with a built-in 6.8 Ohm resistor

- Rd = 6.8 Ohms (hard-wired in series with the LED)
- Vd = 3.0V @ 330mA
- 200 Lumens @ 330mA

Design a circuit which turns on and off the 1W white LED in your lab kit at 10mA when GP18 goes high and low.

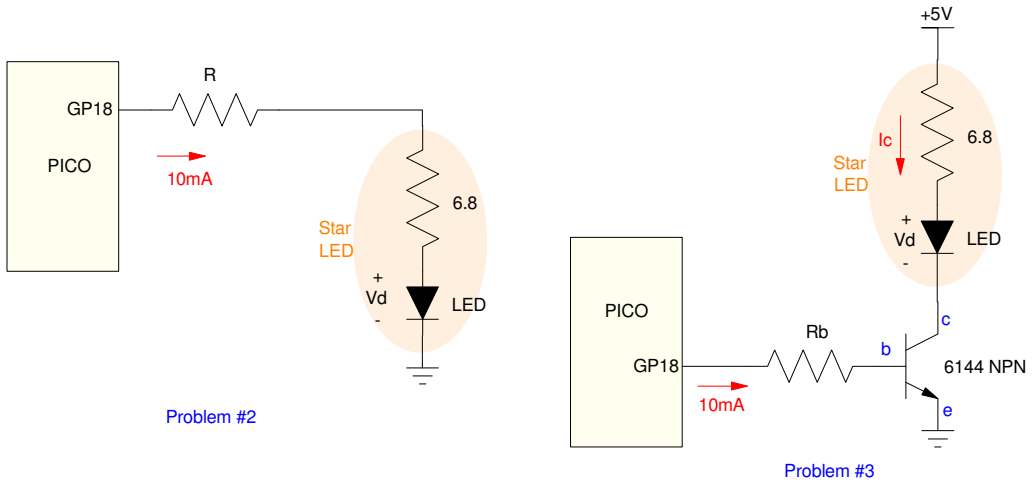
- Verify that the LED is turning on and off with GP18
- Measure the current when the LED is on (measure the voltage across a resistor and compute I)

3) Design a circuit which turns on and off the 1W white LED at 5V when GP18 goes high and low.

- Circuit to the right
- Pick Rb so that Ib = 10mA (approx)

Verify that the LED turns on and off when GP18 goes high and low

- Vbe = 0.7V when on (the voltage drop across a silicon diode)
- Vce = 0.2V when on (the transistor is saturated)
- The LED is a *lot* brighter when turned on with a transistor switch



Strobe Light (take 1)

4) Write a Python program which

- Prompts you for the period of a strobe light in ms, then
- Turns on the 1W white LED for 1ms
- Then off for N-1 ms where N is the period in ms.

5) Run your program on your Pico board and collect data to verify it works.

Strobe Light (take 2)

6) Write a Python program which

- Turns on the 1W white LED for 1ms, and
- Turns it off for N ms

Where N is adjustable using the buttons GP14 and GP15

- GP15 increases N
- GP14 decreases N

7) Run your program on your Pico board and collect data to verify it works.

Demostration

8) Demonstrate either working program

- In-person
- With a video