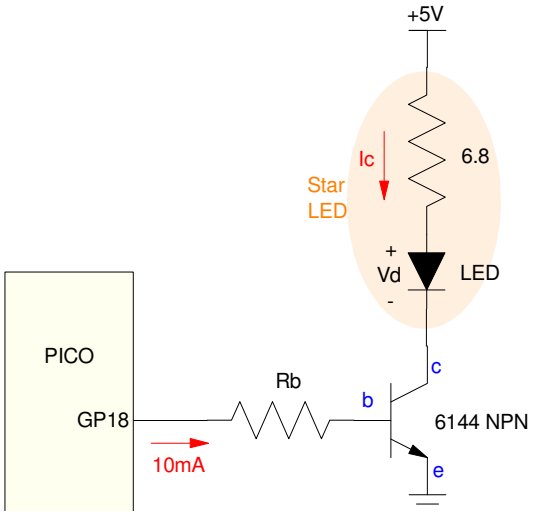
ECE 476/676 - Homework #4

Timing, Analog I/O - Due Monday, September 22nd

Variable Brightness LED

1) Hardware: Connect your Pico to the 1W white LED in your lab kit so that your Pico can turn the LED and off.

Write a test program to verify the Pico can turn the LED on and off



PWM With Push-Button Control

2) Write a Python program which allows you to adjust the brightness of the LED from 0% to 100% using PWM and the push buttons.

- GP15: Increase the brightness
- GP14: Decrease the brightness
- PWM frequency = 1kHz (somewhat arbitary)

3) Run your program and verify that the brightness varies from 0% to 100%

- Measure the voltage on GP18
- The DC voltage on GP18 should vary from 0V (0%) to 3.3V (100%) as the duty cycle varies.

PWM with Analog Inputs

4) Write a Python program which allows you to turn on and off the LED using the push buttons

- GP15 = on
- GP14 = off

The brightness is adjustable with the analog input

- AN1: Sets the brightness from 0% to 100%

5) Run your program and verify that the brightness varies from 0% to 100%

Collect data to show

- Light turns on and off with the push buttons
- Brightness is adjustable with the analog input

Demostration

6) Demonstrate either working program

- In-person
- With a video

Motor Angle Control

5) Hardware: Connect your digital servo motor to your Pi-Pico.

6) Software: Write a Python program which

- Reads the analog input on AN0 (the joystick input) and
- Drives a digital servo motor

The analog input controls the position of the motor using a pulse width

- When the joystick is left in it's rest state (middle position), the motor position remains constant (pulse width is constant)
- When the joystick is pushed forward (towards 3.3V), the motor motor turns CW (pulse width icnreases to 2.5ms)
- When the joystick is pulled back (towards 0V), the motor turns CCW (pulse width slowly decreases to 0.5ms)

7) Test and verify your Python program works

8) Demo (in-person or with a video)