Mini Project 2 Submission

Circuit Design Overview: The circuit design consists of 3 main modules. The first module, called pwm, generates the PWM signal, which is then passed through two additional modules to reach the LED, making it appear to dim and brighten. The pwm module was copied from Brad Minch's Fade example located here (https://github.com/bminch/iceBlinkPico). The inputs to the pwm module are provided by the pwm_wrapper module that creates the pwm_value that is used to control the duty cycle of the PWM signal. The pwm_wrapper module allows us to create a PWM signal with an incrementing duty cycle and another PWM signal with a decrementing duty cycle, which we can choose based on the DUTY_CYCLE_FUNC_MODE parameter. The top module has the state machine and counter to determine when the state needs to change, and has connections to the LED outputs. In summary, there is the top module that has the state machine and calls on the pwm_wrapper module that changes the duty cycle of the PWM signal and then calls on the pwm module that actually makes the PWM signal.

System Verilog Files: https://github.com/H-TejadaDeras/ENGR3410-01.25FA/tree/main/assignments/mini%20project%202

Demo Video: https://olincollege-my.sharepoint.com/:v:/g/personal/htejada_olin_edu/EVCPvocJuQRFvVCHf3_OascBPYcx5lxh6NPgMVCMWSq6GA?nav=eyJyZWZlcnJhbEluZm8iOnsicmVmZXJyYWxBcHAiOiJPbmVEcml2ZUZvckJ1c2luZXNzIiwicmVmZXJyYWxBcHBQbGF0Zm9ybSI6IldlYiIsInJlZmVycmFsTW9kZSI6InZpZXciLCJyZWZlcnJhbFZpZXciOiJNeUZpbGVzTGlua0NvcHkifX0&e=kdxkS6

State Machine Timing Diagram (next page):

Sample PWM Timing Diagram (next page):

Time						
	100 ns	200 ns	300 ns	400 ns	500 n

clk=0

state[2:0]=000 000 001 010 011 100 101 000

RGB_R=0

RGB_G=0

RGB_B=1

Time				
clk=1				
state[2:0]=001	000			
RGB_R=0				
RGB_G=0				
RGB_B=1				
pwm_output_inc=1				
pwm_output_dec=1				