University of Texas at El Paso
Electrical and Computer Engineering Department

EE 4178/5190 – Laboratory for Microprocessors II

LAB 1

LED Controller

Objective:

- Understand how to use the gpio driver library from ESPRESSIF. The lab will consist of using a sweeper, led chaser and any additional led sequence that the student developed which be selected via an input. Students must have a total of three buttons. First button must start sweeper function which student must have completed from the previous lab. Next, the second button must start the led chaser function. Lastly, the third button must toggle the state of the onboard led.

Bonus:

- For EE 4178 is just a bonus and for EE 5190 it is mandatory
  - Create another LED sequence and add another button, as pull-up.
- Bonus for EE 5190
  - Add button to start lightshow that was done in the previous lab.
  - Do a reset button which will turn off all LEDs

Pre-Lab:

- What macro is being used to select if the pin is an output or and input? (write both macros)
- What function reads the pin input?
- What is the main difference between a pullup or a pulldown button?

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C helpful functions

For this lab, there are couple additional functions from ESPRESSIF that are important for using inputs. As the previous lab, we must set the direction of the GPIO pin by using **gpio_set_direction(gpio_num_t gpio_num, gpio_mode_t mode)**. Previously we used ***GPIO_MODE_OUTPUT*** as we are using outputs, however now that we will be using ***GPIO_MODE_INPUT*** for inputs.

- **esp_err_t gpio_set_direction(gpio_num_t gpio_num, gpio_mode_t mode);**

Next, as the name states **gpio_get_level(gpio_num_t, gpio_num)** returns the current level of the GPIO pin whether it high and low. This function is use to get the current state of the input.

- **int gpio_get_level(gpio_num_ t gpio_num);**

Lastly, two function that are very important when using inputs is the setup for either pull-up or pull-down: **gpio_pulldown_en(gpio_num_t gpio_num)** and g**pio_pullup_en(gpio_num_t gpio_num**). Here is a figure for pull-up and pull-down configuration. Pull-up is set to high, therefore, to read the input as a **0**. Therefore, for pull-down as it set to low, it must read a **1** as it input.

- **esp_err_t gpio_pullup_en(gpio_num_t gpio_num);**
- **esp_err_t gpio_pulldown_en(gpio_num_t gpio_num);**