University of Texas at El Paso
Electrical and Computer Engineering Department

EE4178 Laboratory for Microprocessors Systems II

# LAB 02

## GPIO, Interrupts, and Queues

### Goals:

- Given the program template in Listing 1, create a program which uses port interrupts to trigger a task.
- The port interrupts must be connected to external push buttons which will trigger the “print_task”.
- On the “print_task” your program should print that the interrupt was trigger.

### Bonus:

Modify the code so the “print_task” prints what port caused the interrupt. **+10**

### Pre-Lab:

- What is the function use to receive data from a queue?
- What is the function use to send data to a queue from an ISR?
- How do you set up a program to use a GPIO port as input with interrupts?

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```
#include <stdio.h>
#include "sdkconfig.h"
#include "freertos/FreeRTOS.h"
#include "freertos/task.h"
#include "freertos/queue.h"
#include "driver/gpio.h"

#define ESP_INTR_FLAG_DEFAULT 0
static xQueueHandle gpio_queue = NULL;

static void IRAM_ATTR gpio_isr_handler(void* arg)
{
    GPIO.out ^= BIT0;
    uint32_t gpio_num = (uint32_t) arg;
}

static void print_task(void* arg)
{
    uint32_t gpio_num;
    while(1) {
        printf("GPIO[%d] caused an interrupt\n", gpio_num);
    }
}

void setUpGPIO()
{
   gpio_config_t io_conf;

  //INPUT
  io_conf.intr_type = ;
  io_conf.mode = ;
  io_conf.pin_bit_mask = ;
  io_conf.pull_down_en = ;
  io_conf.pull_up_en = ;
  gpio_config(&io_conf);

  //OUTPUT
  io_conf.intr_type = ;
  io_conf.mode = ;
  io_conf.pin_bit_mask = ;
  io_conf.pull_down_en = ;
  io_conf.pull_up_en = ;
  gpio_config(&io_conf);

  //Set ISR
  gpio_install_isr_service(ESP_INTR_FLAG_DEFAULT);
```

```
  gpio_isr_handler_add(xxx, gpio_isr_handler, (void*) xxx);
}

void app_main()
{
        setUpGPIO();
        gpio_queue = xQueueCreate(10, sizeof(uint32_t));
        xTaskCreate(&print_task, "print_task", 2048, NULL, 10, NULL);

                                                        }
```

**Listing 1. Program template for Lab 2.**