CECS 346 Lab 4 – IR Obstacle Avoidance Sensor

Preparation: You will need a LaunchPad and one obstacle avoidance sensor.

Starter project: HelloLaunchPad/EdgeInterrupt/PeriodicSysTickInts

Purpose:

This lab has two major objectives: 1) learn how to use an obstacle avoidance sensor; and 2) review how to build an embedded system with **timer interrupt** and **external interrupt**.

System Requirements:

Build the following basic autonomous control features for a simple smart home: you will use two onboard push buttons to simulate a garage door control buttons, three onboard LEDs to simulate garage door status, and an obstacle avoidance sensor to detect any obstacle approaching the house. Design and implement the following features:

1. The system starts with green LEDs on.
2. When the obstacle avoidance sensor detects an obstacle moving into a distance range of 15 cm, turn off the green LED and flash red LED with a frequency of 2Hz for 3 seconds, and then turn on the blue LED.
3. When the obstacle avoidance sensor detects an obstacle moving away from a distance range of 15 cm, turn off the blue LED, flash red LED with a frequency of 2Hz for 3 seconds, and then turn off the red LED and turn on the green LED.
4. When the obstacle avoidance sensor does not detect any obstacle approaching, press the onboard sw1(left push button) will turn off the green LED and flash red LED with a frequency of 2Hz for 3 seconds, and then turn on the blue LED. Press the onboard sw2(right push button) will turn of the blue LED, flash red LED with a frequency of 2Hz for 3 seconds, and then turn off the red LED and turn on the green LED.

You are required to use **SysTick timer with interrupt** to implement the timing for LED flash and **external interrupt** for push button and obstacle avoidance sensor. <u>You are required to add button debouncing code for both the push-buttons and the obstacle avoidance sensor.</u>

Deliverable:

1) Demonstrate your lab on board over Zoom.
2) Submit a lab report (e.g. Word Document) to the Beachboard Dropbox containing:
    a. Class name, lab number and name, your name
    b. Schematic of your hardware
    c. A picture of your embedded system
    d. Software source code: The .c file
    e. Video or video link for your onboard and simulation demonstration.

You can attach items a, b, c, e to end of this file. Submit the source code separately.