

ECE 376 - Homework #3

Binary Inputs, Binary Outputs (LEDs). Due Monday, September 11th

Binary Inputs (Hardware)

The light sensor in your kit has a resistance - light relationship

$$R \approx \frac{100,000}{Lux}$$

1) Design a circuit that outputs

- 0V when the light level is less than 40 Lux
- 5V when the light level is more than 40Lux

2) Design a circuit with hysteresis:

- The output becomes 0V when the light level drops below 40 Lux
- The output becomes 5V when the light level exceeds 50 Lux
- No change between 40 Lux and 50 Lux

Binary Outputs (LEDs)

3) Design a circuit which allows a PIC to turn on and off each color of a Piranah LED at 20mA. The specifications for the LEDs are:

- Red: $V_f = 1.8V$ 8000 mcd @ 20mA
- Green: $V_f = 3.0V$ 8000 mcd @ 20mA
- Blue: $V_f = 3.0V$ 8000 mcd @ 20mA

Lab

Design an embedded system using your PIC processor, a binary input, and an LED. Some suggestions are:

- 5-Mode LED Flashlight: Requirement:
 - Inputs - RB0 to RB3
 - Output: RGB LED at 20mA when on, +/- 2mA.
 - Relationship: Output a color based upon the color pushed. RB0 = off, RB1 = red, RB2 = green, RB3 = blue, RB4 = white (RGB all on).
 - \$65 Random Number Generator: Turn your PIC in to a random number generator. Output a random number on PORTD depending upon which button you push:
 - RB0: 0 to 4 (4-sided die)
 - RB1: 0 to 6 (6-sided die)
 - RB2: 0 to 10 (10-sided die)
 - Other. Come up with your own problem.
- 4) Requirements: Specify the inputs, outputs, and how they relate.
- 5) Code: Give a program listing and an explanation for how it works.
- 6) Flow Chart: Give a flow chart which follows your code.
- 7) Validation: Collect data to validate that your code meets your requirements.
- 8) Demo: Demonstrate your program works, either in person or with a YouTube video. (Also verifies that your board works).

Note: If you can't get your board to work, please stop by & see Dr. Glower. I can usually get them working in 10-15 minutes by touching up the solder connections. You'll need your board for the rest of the semester.