CSC 615 Assignment 1 – Traffic Light

Welcome to your first homework assignment.

As this is your first let's set some expectations. Code should be neat, well documented. Variables should have meaningful names and be in a consistent format (I do not care if you use camelCase or under_scores in variables but be consistent. In addition, each file should have a standard header as defined below.

```
/*************************************************************
* Class:  CSC-615-01 Spring 2020
* Name:
* Student ID:
* Github ID:
* Project: <project name> like Assignment 1 - Traffic Light
*
* File: <name of this file>
*
* Description:
*
*************************************************************/
```

This is an INDIVIDUAL assignment. You can (and should) work in groups to research how to do the assignment, but each person should code their own version and make their own submission.

This is a physical class, so I will want to see what you do in action. Documentation, including short video clips (can use your cell phone) are required as part of the submission. It might be handy to have a friend/family member record while you execute your program.

You will also need to submit hardware drawings. These should be neat (can be either electronic or hand drawn, then scanned) of how the hardware is connected to the Raspberry Pi. This includes which pin (physical and GPIO), positive and negative flow, resisters, etc. I should be able to rebuild your setup from this diagram and then run your program and get the same results.

Assignment Description

1. Read the following page "Component Knowledge".

2. Create a Traffic Light, using one Red, one Yellow, and one Green LED. The Green LED should be on for 6 seconds, then the light should switch to the Yellow light which should be on for 1.5 seconds, then switch to Red for 5 seconds. Then repeat the cycle 2 more times.

3. You need **two versions of your code**. The first is to use the wiring Pi library (http://wiringpi.com/). The second version can utilize either file I/O (sysfs) operations , the RPIO library (https://pythonhosted.org/RPIO/index.html), or direct register access. See https://elinux.org/RPi_GPIO_Code_Samples for some examples.

4. Submit your homework in the Github Classroom Repository and in iLearn per the submission details below

Component Knowledge

LED

LED is a kind of diode. LED will shine only if the long pin of LED is connected to the positive electrode and the short pin is connected to negative electrode.
This is also the features of the common diode. Diode works only if the voltage of its positive electrode is higher than its negative electrode.
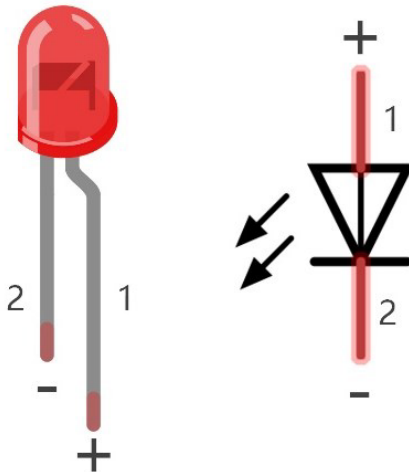
LED	Voltage	Maximum current	Recommended current
Red	1.9-2.2V	20mA	10mA
Green	2.9-3.4V	10mA	5mA
Blue	2.9-3.4V	10mA	5mA
Volt ampere characteristics conform to diode			

The LED can not be directly connected to the power supply, or it will damage the component. A resistor with certain resistance must be connected in series in the circuit of LED.

Resistor

The unit of resistance(R) is ohm(Ω). 1mΩ=1000kΩ, 1kΩ=1000Ω.
Resistor is an electrical component that limits or regulates the flow of current in an electronic circuit.
The left is the appearance of resistor, and the right is the symbol of resistor represented in circuit.

Color rings attached to the resistor is used to indicate its resistance.

With the same voltage there will be less current with more resistance. And the links among current, voltage and resistance can be expressed by the formula below: I=V/R.
In the following diagram, the current through R1 is: I=V/R=5V/10kΩ=0.0005A=0.5mA.

Do not connect the two poles of power supply with low resistance, which will make the current too high to damage electronic components.
And resistor has no poles (i.e. not positive or negative).

Submission Details

You need to submit the following files in the Github Classroom Repository:

1. All .c and .h source code files (for both versions).

2. A makefile file to build your program (the file MUST be called **Makefile**). The executable output files MUST be called **assignment1wpi** and **assignment1b**.

3. A PDF that is clear and readable with your hardware diagram (make sure to indicate polarity and pin numbers).

4. A mp4 file showing your traffic light in action (only one cycle please to keep the video size small).

5. A PDF writeup that describes the assignment, what you did, the issues you had and how you resolved them. Do not forget to have your name, ID, and Github ID in this document. (This file MUST ALSO be submitted to iLearn).

All parts of the submissions must have your name, student ID number, and github user name. For Video's please have at least a 2 second clip at the beginning with your Student ID card clearly visible. (In absence of your student ID card print out your Name and ID number on paper and film that).

Please post questions to the slack channel.

Grading Criteria

Grading criteria will be based on the following:

Completion and success of the assignment	25%
Code well structured, original and well documented	50%
Hardware Diagram	15%
Video	10%

Instructions followed (this includes submission requirements)
This is only a detractor from your grade, i.e. failure to follow the instructions will result in a reduction from the grade calculated from the criteria above.   -50%