ELEG 3923 Microprocessor System Design

Lab 3 Traffic Light Controller

I. Objectives

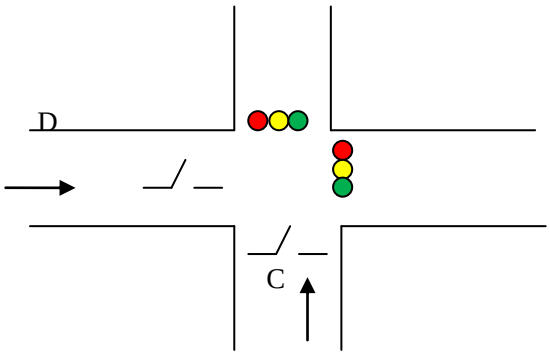
- To create a traffic light controller with 8051.

II. Materials

- Keil uVision3 development environment.
- 8051 hardware development kit (MDE-8051)
- Jumper kit
- Resistors

III. Pre-lab

- Draw the flowchart of the program.
- Write the code in assembly language



IV. Procedures (Week 1 and Week 2)

Consider a typical 4-way cross-road as shown in Fig. 1. The streets are labeled as College Ave. (C) and Dickson St (D). There are two car sensors (use two switches on the trainer board to simulate the two sensors), and two groups of traffic lights. Assume both roads have only one way traffic as pointed out in the arrow. The basic requirements are described as follows

1. If there are no cars (both switches are off), or both intersections have cars (both switches are on), the traffic light follows the regular cycle: Green (4 seconds) → Yellow (1 second) → Red (5 seconds) → Green (4 seconds)→ …… When one direction is Green or Yellow, the other direction must be Red.
2. If (1) there is a car waiting in one direction (e.g. D switch is on), and (2) no car in the other direction (e.g. C switch is off) and (3) the traffic light for the waiting car is red (e.g. D is red), then change the traffic light in the other direction (e.g. C) to yellow immediately. After D is changed to green, keep it green until both of the car sensors are on or off. Then resume the regular cycle.
3. You are free to modify the number of inputs/outputs (e.g. pedestrian walk button), and the operations (e.g. no green can stay longer than 10 seconds, the green should be at least 2 seconds long, etc.), as long as your system is at least as complex as the one described in Steps 1 and 2.