

Embedded Systems Fall 2012—Project 4

Due December 10, 2012

The main objective for this lab is to make a reliable system to carry out the designated task.

Your goal is to implement a traffic light which will be controlled by **SOFTWARE** and will use priorities to tell the operating system how to schedule the different tasks .

The times for each task should be related to times for an actual traffic light, e.g., how long should the light stay green / yellow / red? Your report should specify how you chose the times for each event.

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The traffic light will control the traffic at the intersection of Primary Street and Secondary Street. P===|=====

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Tasks:

- A. Primary Street is a main thoroughfare, with heavy traffic. Secondary Street is used by fewer vehicles. This difference should be reflected in the relative times that traffic on each street has a green signal.
- B. Primary Street also has left turn lanes onto Secondary Street (in both directions). If there is a vehicle in either of these lanes when it is time for Primary Street to have a green signal, there should first be a task run to enable these vehicles to make left turns, while the other traffic on Primary Street and Secondary Street gets a stop signal.
- C. There are also pedestrian buttons for crossing both Primary Street and Secondary Street. If any of these buttons is pushed, a task to make all vehicles stop and allow for pedestrians to cross the streets should be run.
- D. There is also an emergency setting, which sets lights in all directions to flashing red. This setting is triggered by a special signal which includes a specific duration to be in this state. At the end of this time, the system should return to task A.
- E. There is also a “broken” setting which is activated when there is a power outage, e.g., and which sets the signals on Primary Street to flashing YELLOW and the signals on Secondary Street to flashing RED. This setting is deactivated manually, with a return to task A.
- F. And finally there is a manual setting in which the signals are switched by hand. This task is triggered by a switch operated by a human and is turned off by another switch, at which time the system should return to task A.

As part of your assignment, you need to decide on the priorities for these tasks. You also need to develop reasonable I/O choices to indicate when a task (B-F) must be run and which task is currently running.

Your report for this project should follow the same format as the previous reports. Be sure to include important design information, such as the (hypothetical) maximum speed at which your circuit can run, the critical path, hardware resources used, and power information. Also explain clearly how you prioritized the tasks, how you are doing I/O (using devices on the board), and how you chose the times for the various events in your system.