

Project – Traffic Light

TA: wuych1@shanghaitech.edu.cn

In this project, you need to design circuits to implement a simplified traffic light model step by step.

Task List:

1. For a traffic light, you should have three kind of lights recycling. So, you should build a circuit to make 3 LEDs, green-LED, yellow-LED, and red-LED turned on one by one and recycling, but in the same time only one LED is on.
2. Actually, the traffic lights don't have equal time for each light to be on. To modify your model, you should make the following process as a recycle: (At least satisfy the proper proportion)
 - a) The green-LED stays on for 15s
 - b) The yellow-LED stays on for 3s
 - c) The red-LED stays on for 10s
3. A traffic light without telling you the left time is always annoying. To improve your traffic light, you can add two seven-segment displays to show the left time for each state, which works like a recycling countdown timer.
4. Now, you have a perfect traffic light. It's time to show your talent in self-study and circuit design! To achieve higher grades, you can also try to don't use a counter chip (e.g. implement it by more basic components like flip-flop) to finish the above tasks.
5. You can also use your life experience and imagination to add new functions to your traffic light (e.g. red light running alarm or a green light trigger)

Grading rule:

1. Task 1 - 3 are the basic requirements to pass the project. And Task 4 - 5 are bonus.
2. For Task 4 - 5, just implement in stimulation can also brings you some of bonus credits.

You should do:

1. Firstly, find out the circuits schematics and run simulation in Multisim. (40%).
2. Secondly, buy some components and devices used in your circuits, and work with your TA to find out which components are already available in laboratory (like resistors and capacitors).
3. Thirdly, build your circuits in the provided multi-holes board, debug and run your circuits. (40%).
4. Finish the midterm-report and final-report (one for a team). In your report, write clearly the work done by each team member. (20%).

You can only use components and devices such as J-K flip-flop, 555-timer, 74 series chip, resistors and capacitors. Never use any microcontroller like 51, PIC ...

In your report, you need to write clearly the reference paper or websites you referred in your design, and the differences from your own work.