

Traffic light system using atmega32

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Edited after reviewing:

- Added FlowChart for the system
- Added systems constrains
- Added video describing the report.

System Description

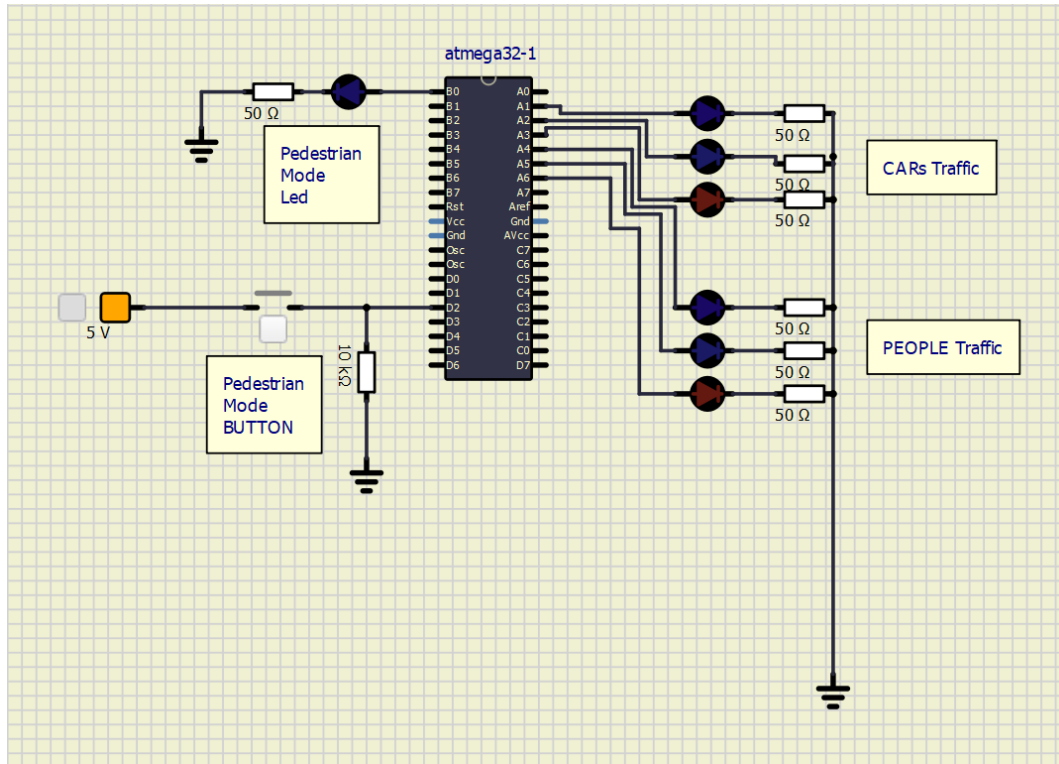
System is considered a simulation of a real traffic light system with pedestrian mode option. Mostly, the system priorities people to cross the road on pushing the button.

Modes:

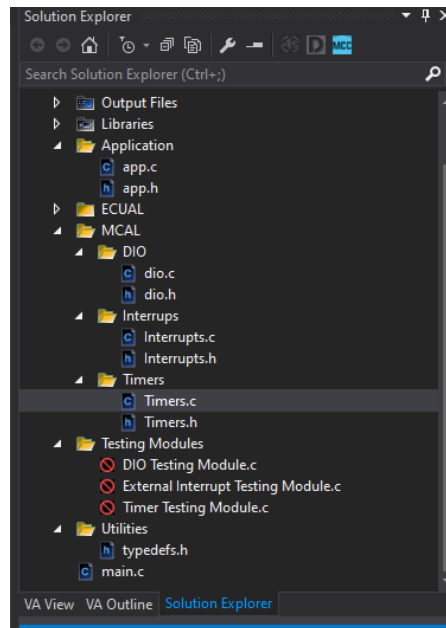
- 1- **Normal mode**: in which lights changes from (red) to yellow blinking then to green and vise-versa for car LEDs. On the other hand, people LEDs operates in the opposite logic of car ones.
- 2- **Pedestrian mode**: in which the system gives priority to people who wants to cross the road by accelerating the traffic light logic forward to let them pass on their green light.

System design

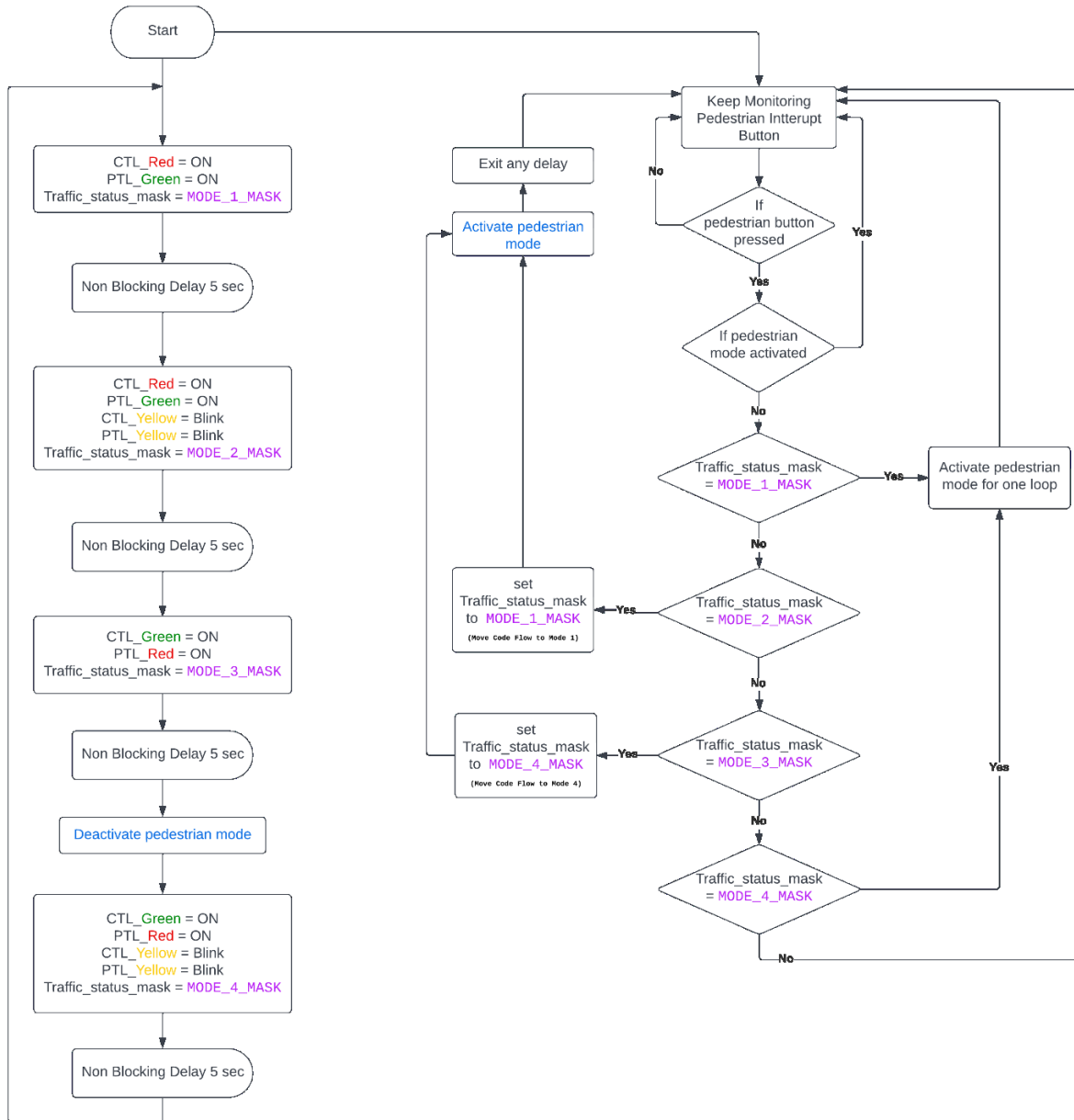
Hardware:



Software Structure Layers:



System Flow Chart



Flow Chart Keys :-

CTL = Car Traffic Light
PTL = Pedestrian Traffic Light

Mode1 = CTL_Red + PTL_Green
MODE_1_MASK = 0b01000001

Mode2 = CTL_Red + PTL_Green
+ CTL_Yellow + PTL_Yellow
MODE_2_MASK = 0b10000010

Mode3 = CTL_Green + PTL_Red
MODE_3_MASK = 0b00010100

Mode4 = CTL_Green + PTL_Red
+ CTL_Yellow + PTL_Yellow
MODE_4_MASK = 0b00101000

System state machine

I recorded video to describe this table which represent different states of the system.

Video name:

01 System Design .m4v

normal mode		pedestrian interrupt mode
①	CR PG 5s	Do nothing P-mode = 1 P-press = 1
②	CRY PGY 5s	① → ② → Return ③ 5s 5s P-mode = 1 P-press = 1
③	CG PR 5s	④ → ① → ② → Return ③ 5s 5s 5s P-mode = 1 P-press = 1
④	CGY PRY 5s	Do nothing P-mode = 1 P-press = 1

System Constrains

The system gives priority to the pedestrian with to cross the road but with some limitations and restrictions:

1. Pedestrian have to click the button to inform the system he wants to cross the road, so it would give him priority over cars.
2. Pressing the button more than one time in short period will do nothing, as the system ignore all of them instead the first one. System starts to activate pedestrian mode again after a full cycle of the traffic lights, so the cars would have a chance to pass also in case there is a lot of people want to cross the road.
3. Keep pressing the button for long period will be treated as a short press, no matter the person kept pressing for how long.
4. System lights operates on four specific types:
 - a. *Car Green - Pedestrian Red*
 - b. *Car Green and Yellow – Pedestrian Red and Yellow*
 - c. *Car Red - Pedestrian Green*
 - d. *Car Red and Yellow – Pedestrian Green and Yellow*
5. Only start passing the road if and only if Pedestrian's Green only is ON, because it takes around **5 seconds** to cross the road which is the yellow blinking period.
6. According to point No.4, it is prohibited to start crossing the road if the Car's Yellow is blinking. Only if you started to pass the road before Car's Yellow start to blink, then you have enough time to pass the road before the Car's turns Green again.