Design and System Lab
Assignment-
Traffic Lights Controller

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1) Diagram.

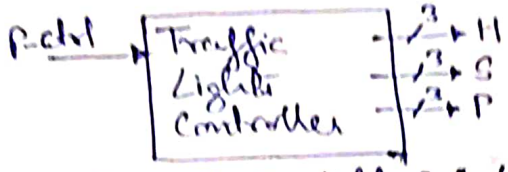

Fig 1: Traffic Lights Controller.

where
P_ctrl: pedestrical control
H: Highway Lights
S: Sideway Lights
P: Pedestrian Lights

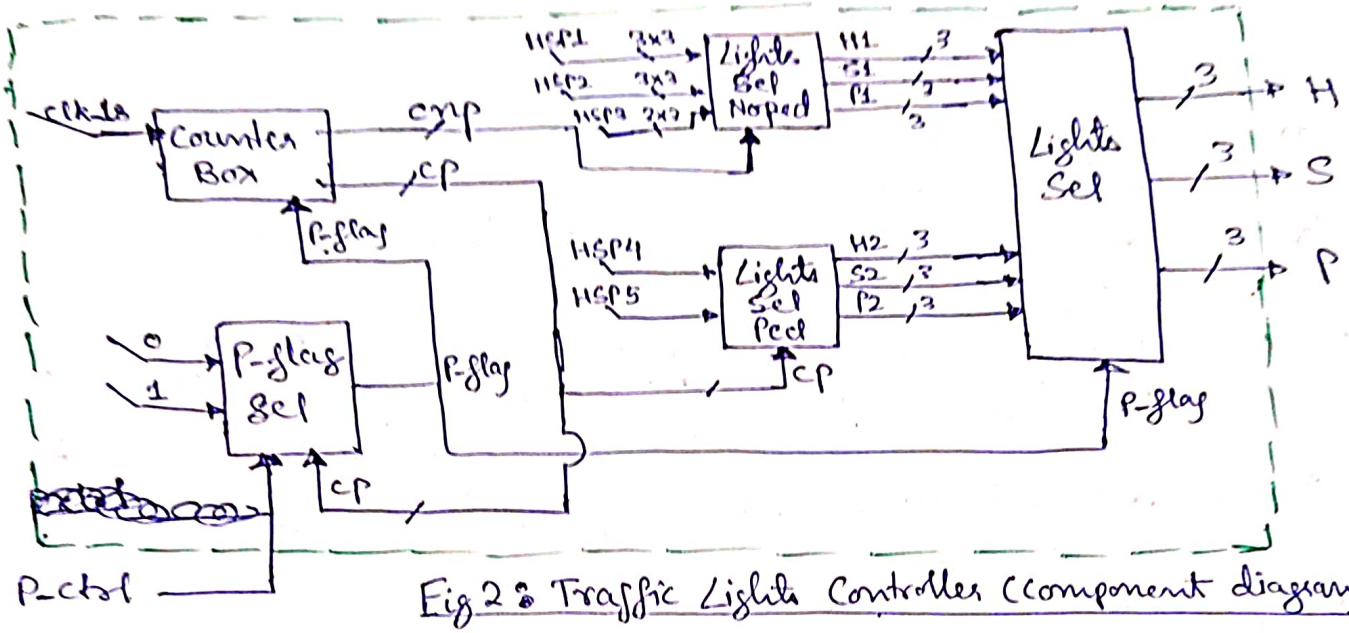

Fig 2: Traffic Lights Controller (Component diagram)

2) Components

(•) counter Box: Increases counters 'cnp' and 'cp' at rising clock event based on the value of 'P_flag'

(•) P_flag Sel: Sets 'P_flag' to '0' or '1' based on 'P_ctrl' and 'cp'

(•) Lights Sel Noped: Selects between states HSP1, HSP2 and HSP3 (state for lights when no pedestrian) depending upon value of 'cnp' counter

(•) Lights Sel Ped: Selects between states HSP4 & HSP5 (state for lights when pedestrian wants to cross) depending upon the value of 'cp' counter

(•) Lights Sel: Selects between the output of components 'Light_Sel_noped' and component 'Light_Sel_Ped' depending upon the value of 'P_flag'

3) Encoding used for Light signals –

"001" ⟶ Red
"010" ⟶ Yellow
"100" ⟶ Green

List of Light Signals
H, S, P
H1, S1, P1
H2, S2, P2

4) Working

(•) Initially → Highway light is green
Sideway light is red
Pedestrian light is red.

(•) When no pedestrian wants to cross –
(i) Highway light is green and sideway light is red for 10 min.
(ii) Then both highway & sideway lights are yellow for 10 sec.
(iii) Then highway light is red and sideway light is green for 1 min { ∵ 2017UEEC0071 → entry no. ends with '1' so sideway is green for 1 min }
(iv) Then both highway & sideway lights are yellow for 10 sec.
(v) Repeat

<Note :- Pedestrian lights are red in this case.>

(•) When pedestrian wants to cross, he/she press a button setting 'P_ctrl' to '1' and then –
(i) Highway, sideway and pedestrian lights are yellow for 10 sec
(ii) Then, highway & sideway lights are red while pedestrian light is green for 1 min.
(iii) Then, again all lights are yellow for 10 sec. after which the lights control goes back to no_pedestrian_crossing state (resumes from where it left)

<Note: Multiple button press by pedestrian within 1 min (more precisely within pedestrian crossing process) are handled by the controller and counted as one press only. So, if the pedestrian gets impatient and hits the button multiple times like in an elevator, No Problem machine handles it! ☺>