VLSI DESIGN

FINAL PROJECT

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PROJECT TITLE : TRAFFIC LIGHT CONTROLLER WITH PEDESTRAIN SIGNAL.

BOARD FAMILY : SPARTAN7

1,Design sorce

```
module traffic_light_controller(
    input  wire clk,
    input  wire reset,
    input  wire pedestrian_request,
    output reg [2:0] traffic_light,
    output reg pedestrian_light
);
    localparam GREEN  = 2'b00;
    localparam YELLOW = 2'b01;
    localparam RED    = 2'b10;

    reg [1:0] state, next_state;
    reg [3:0] timer;
    reg pedestrian_waiting;
     always @(posedge clk or posedge reset) begin
        if (reset) begin
 state <= GREEN;
            timer <= 0;
            pedestrian_waiting <= 0;
        end else begin
```

```
        if (pedestrian_request)
            pedestrian_waiting <= 1;



        if (state == RED && timer >= 10)
            pedestrian_waiting <= 0;
       if (state != next_state)
            timer <= 0;
        else
            timer <= timer + 1;
       state <= next_state;
    end
end
    always @(*) begin
    case (state)
        GREEN:   next_state = (timer >= 10) ? YELLOW : GREEN;
        YELLOW:  next_state = (timer >= 3)  ? RED    : YELLOW;
        RED:     next_state = (timer >= 10) ? GREEN  : RED;
        default: next_state = GREEN;
    endcase
end
    always @(*) begin
    case (state)
        GREEN: begin
            traffic_light = 3'b001;
            pedestrian_light = 0;
        end
        YELLOW: begin
```

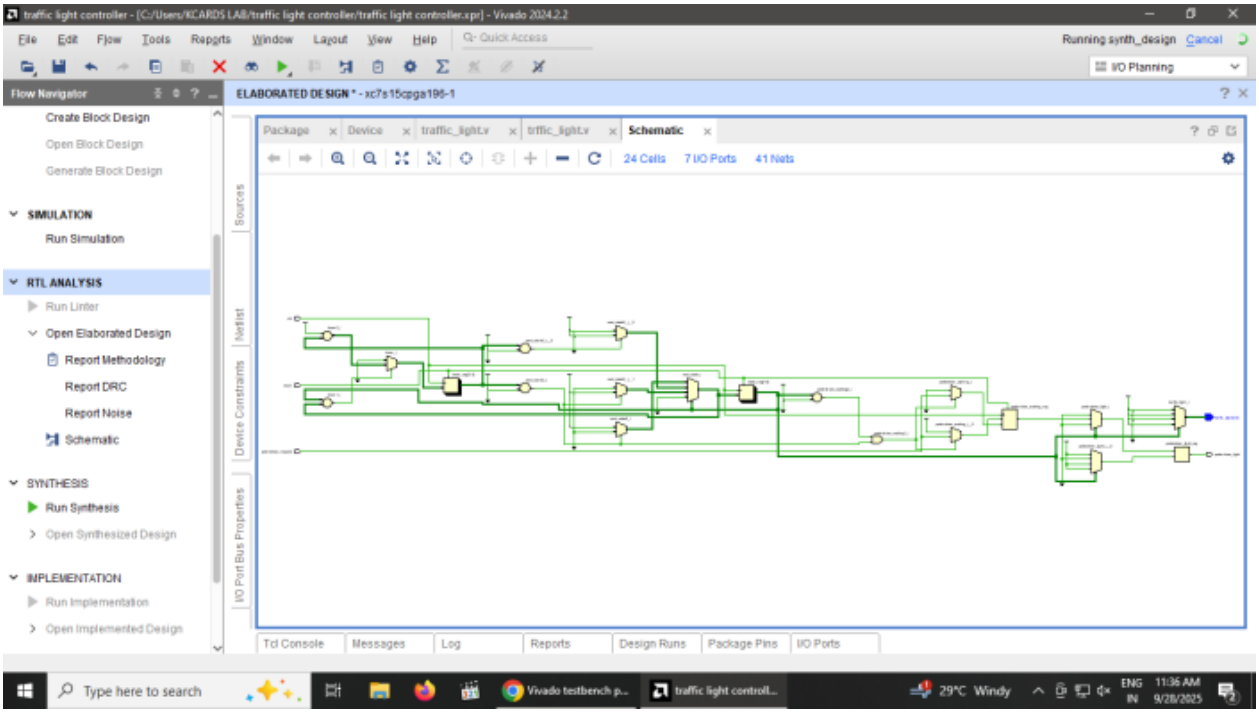
```
            traffic_light = 3'b010;
            end
        RED: begin
            traffic_light = 3'b100;
            pedestrian_light = (pedestrian_waiting) ? 1 : 0;
        end
        default: begin
            traffic_light = 3'b001;
            pedestrian_light = 0;
        end
    endcase
  end
endmodule
```

2,SIMULATION SOURCE

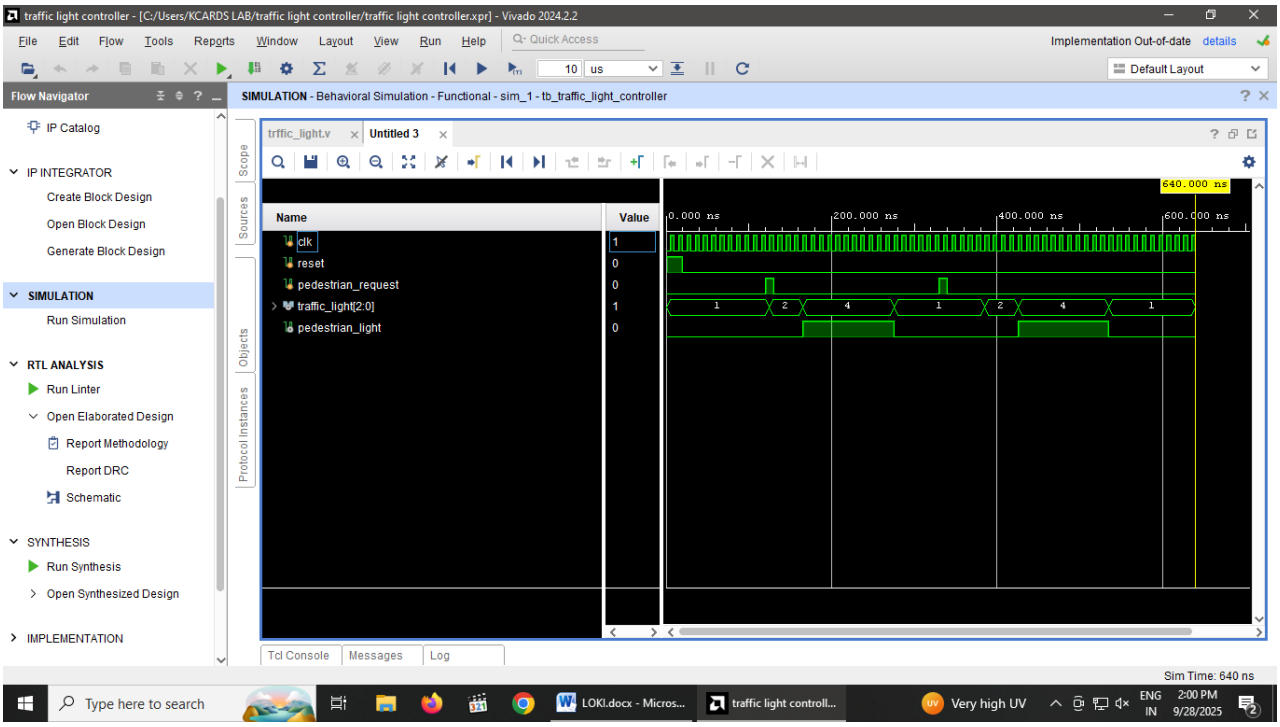
```
`timescale 1ns / 1ps
module tb_traffic_light_controller;
  reg clk;
  reg reset;
  reg pedestrian_request;
  wire [2:0] traffic_light;
  wire pedestrian_light;
  traffic_light_controller uut (
    .clk(clk),
    .reset(reset),
    .pedestrian_request(pedestrian_request),
    .traffic_light(traffic_light),
    .pedestrian_light(pedestrian_light)
  );
```

```
    initial begin
        clk = 0;
        forever #5 clk = ~clk;
    end
    initial begin
        reset = 1;
        pedestrian_request = 0;
        #20 reset = 0;
        #100;
        pedestrian_request = 1;
        #10 pedestrian_request = 0;
        #200;
        pedestrian_request = 1;
        #10 pedestrian_request = 0;
        #300;
        $stop;
    end
    initial begin
        $monitor("Time=%0t | Traffic Light={R,Y,G}=%b | Pedestrian=%b",
                $time, traffic_light, pedestrian_light);
    End
+
endmodule
```

3,RTL ANALSYS

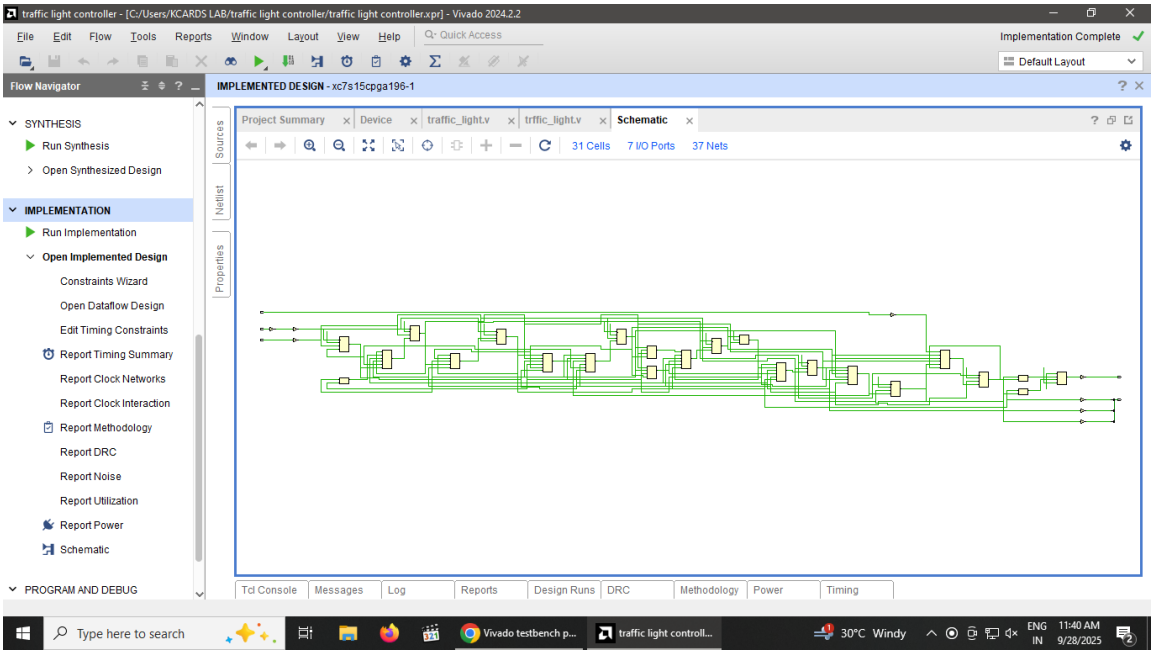


4,simulation

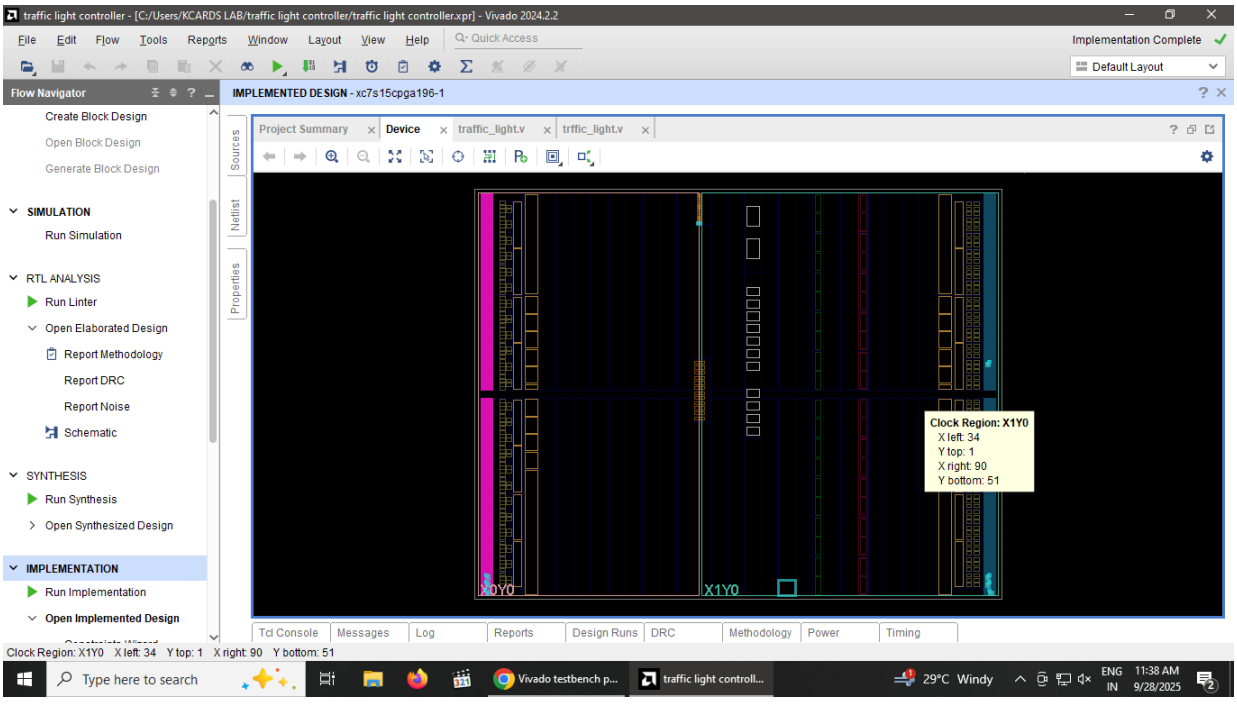


5,synthesis

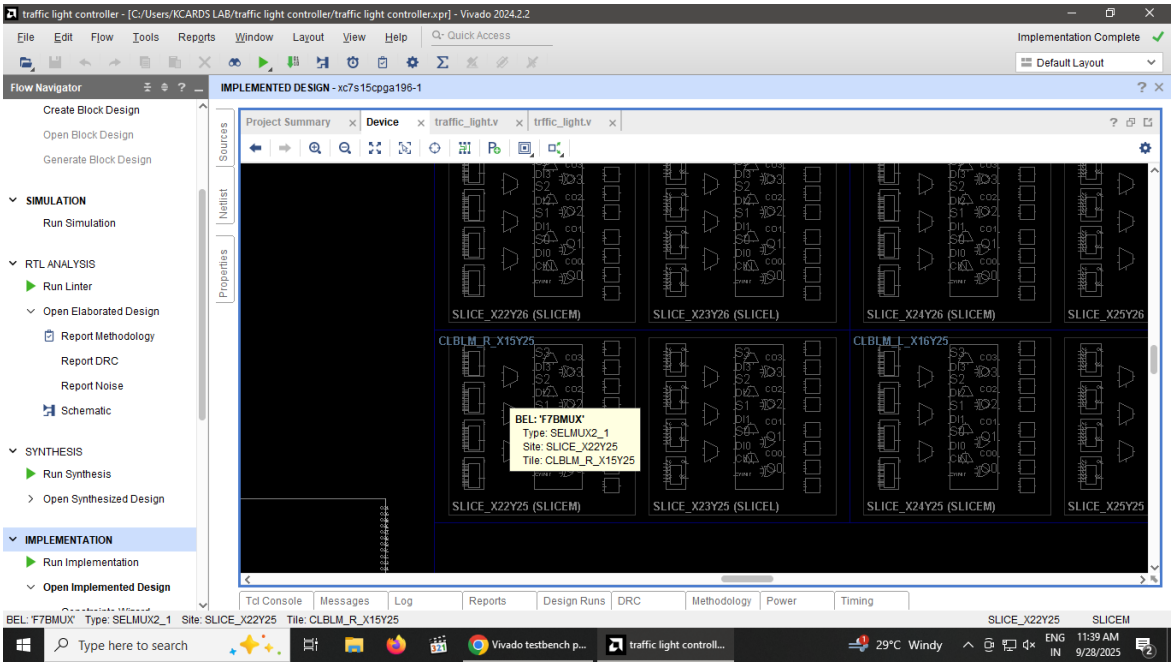
5.1 chamatic:



5.2 Divice

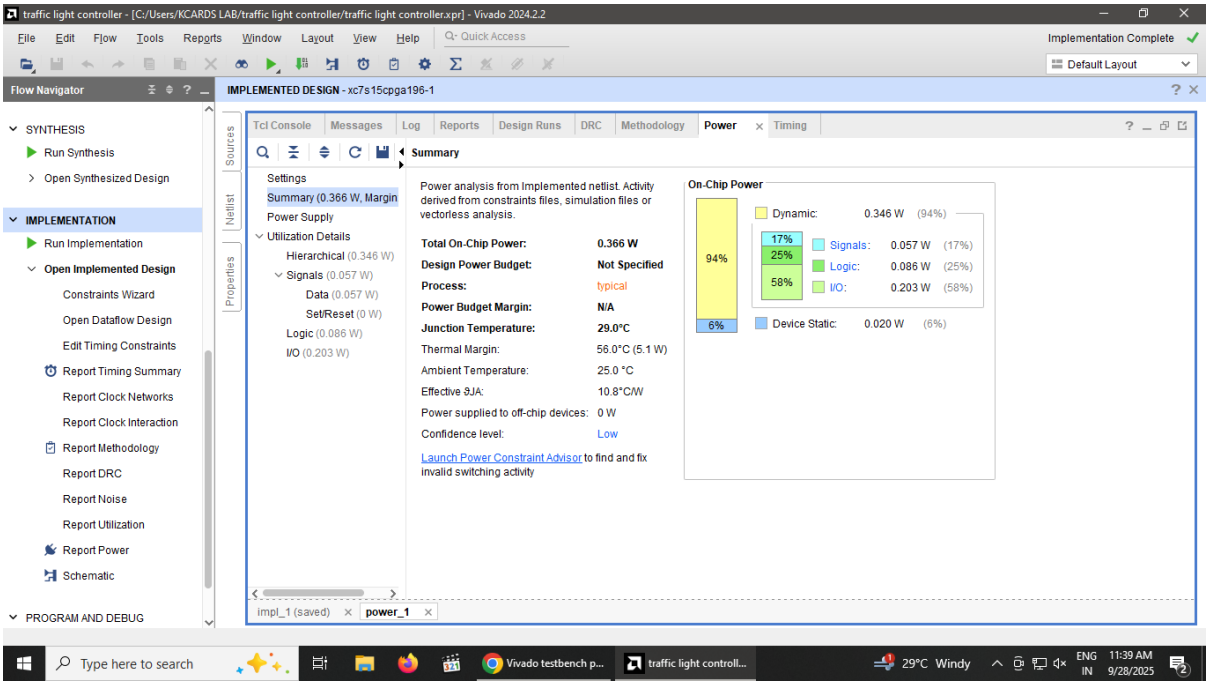


5.3 Graph

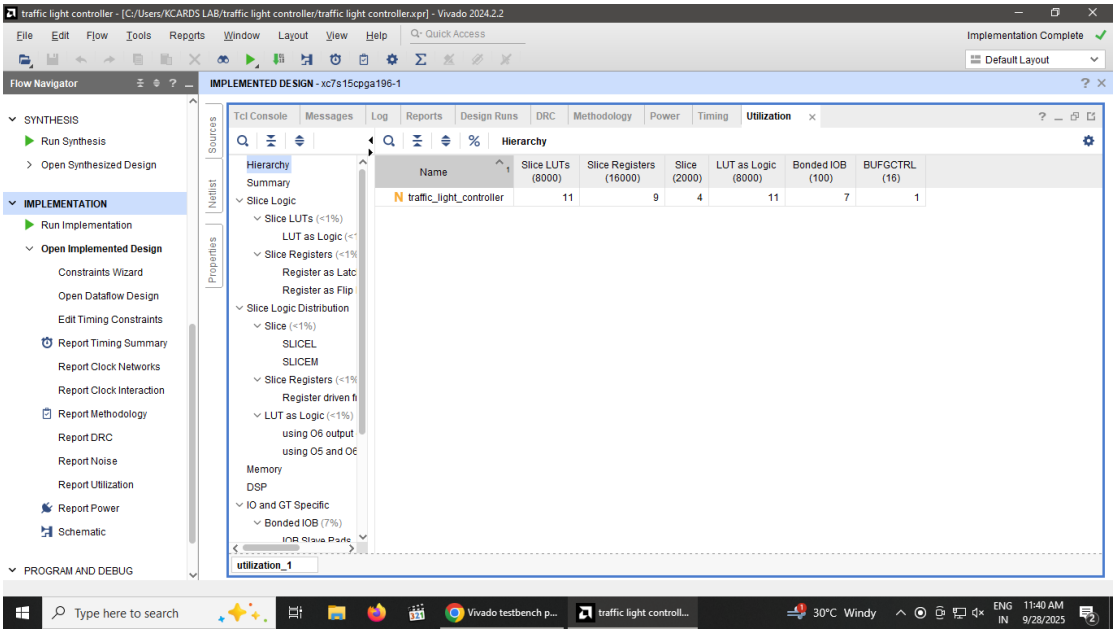


6,Synthesis report

6.1 Power:



6.2 Utilization



7,Implementation