ELP 831

IEC LAB – 1

Display Timer

Submitted by:
Maya Khangembam
EEN212020

1 Introduction

1.1 Referenced documents

List all documents (specifications, standards, journal articles, text books) useful to help understand the current document.

1.2 Design library name

Display_Timer

1.3 People involved in the block

Maya Khangembam (EEN212020)

2 Function

2.1 Brief overview

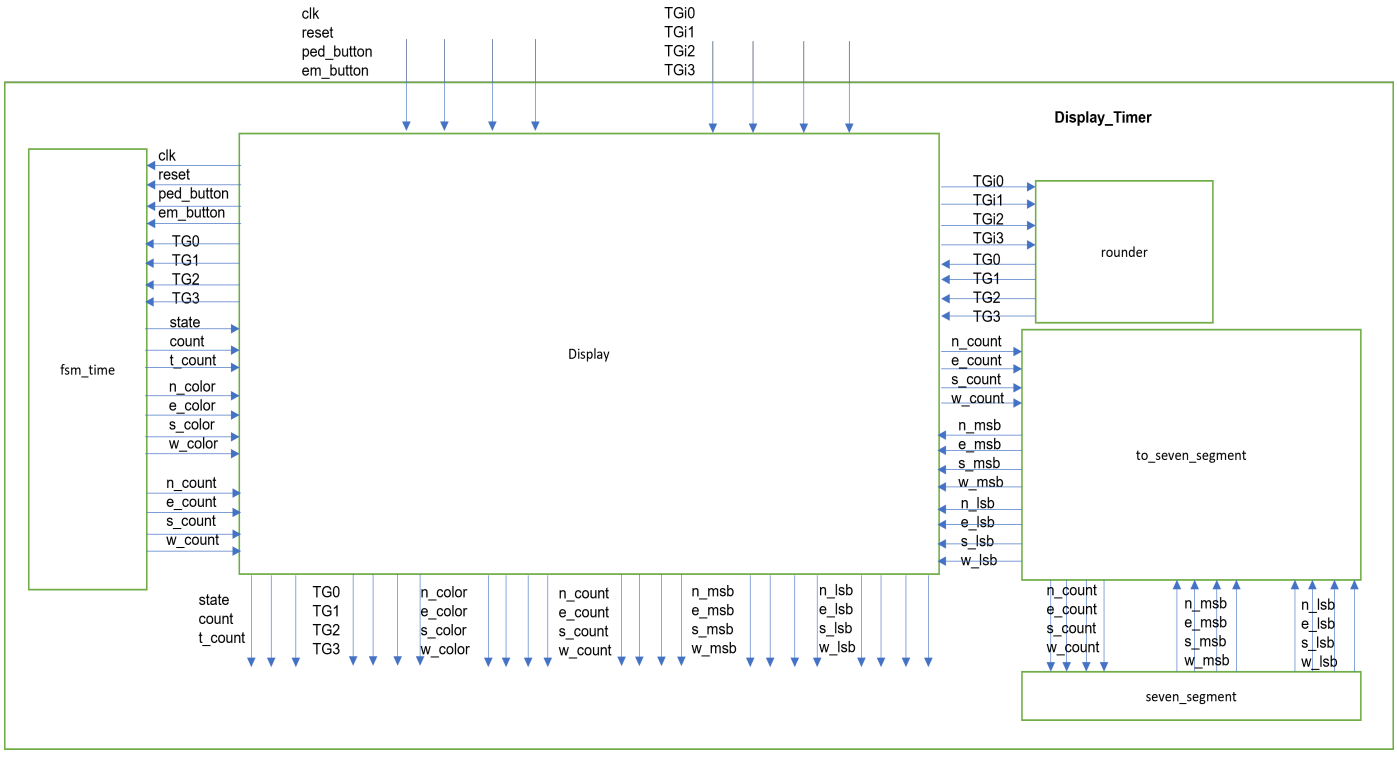
The block takes in the 4 green signal times and pedestrian and emergency signals and outputs the time count of each signal on each road as well as the color of lights at each road.

2.2 Interfaces

Signal Name	Bus Size	I/O	Description	Logical Grouping
clk	1	input	Clock signal input	
reset	1	input	Reset signal input	
ped_button	1	input	Pedestrian signal	
em_button	1	input	Emergency signal	
TGi0	8	input	Green light duration at north road	
TGi1	8	input	Green light duration at east road	
TGi2	8	input	Green light duration at south road	
TGi3	8	input	Green light duration at west road	
TG0	8	output	Rounded value of TGi0	
TG1	8	output	Rounded value of TGi1	
TG2	8	output	Rounded value of TGi2	
TG3	8	output	Rounded value of TGi3	
N_color	56	output	Signal color at North road	
E_color	56	output	Signal color at East road	

S_color	56	output	Signal color at South road	
W_color	56	output	Signal color at West road	
n_count	8	output	Timer count at North road	
e_count	8	output	Timer count at East road	
s_count	8	output	Timer count at South road	
w_count	8	output	Timer count at West road	
t_count	8	output	Count of complete cycle	
n_msb	7	output	Seven segment display of msb	
n_lsb	7	output	Seven segment display of lsb	
e_msb	7	output	Seven segment display of msb	
e_lsb	7	output	Seven segment display of lsb	
s_msb	7	output	Seven segment display of msb	
s_lsb	7	output	Seven segment display of lsb	
w_msb	7	output	Seven segment display of msb	
w_lsb	7	output	Seven segment display of lsb	

2.3 Architecture



2.4 Detailed functional description

There are 5 modules:

- **Display (Top Module):** connects and calls all other modules. Takes TGx values, emergency signal and pedestrian signal and outputs color and count at each road, current state, count at current road and seven segment values for the msb and lsb for the count at each road.
- **fsm_time:** Takes in the different TGx values as well as emergency and pedestrian signals and outputs the color and count at each road as well as the current state and count at current road
- **rounder:** Takes in a value and rounds off and returns the value
- **to_seven_segment:** Takes value and divides it into it's msb and lsb and sends them to the seven_segment module
- **seven_segment:** Takes value and outputs seven segment values

4 Verification Strategy

4.1 Tools and Version

Tool used is Xilinx Vivado.

6 Tests Specification

The modules perform as expected under:

- Normal operation
- Emergency button pressed at a green light
- Emergency button pressed at an orange light
- Pedestrian button pressed at a green light
- Pedestrian button pressed at a green light

7 Bugs known at submission date

Emergency and pedestrian cases could not be implemented yet.