

**Implementation of Traffic Light Controller Using VHDL**

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**Abstract**

In this report, the design and implementation of a real-time traffic light control system based on Field programmable Gate Array (FPGA) technology is reported. The traffic light control system is designed with VHDL language. Its function was verified with simulation. After that, the VHDL design was downloaded to FPGA board hardware to verify its function in experiment. The designed traffic light control system was shown to work properly as expected

**I. Introduction**

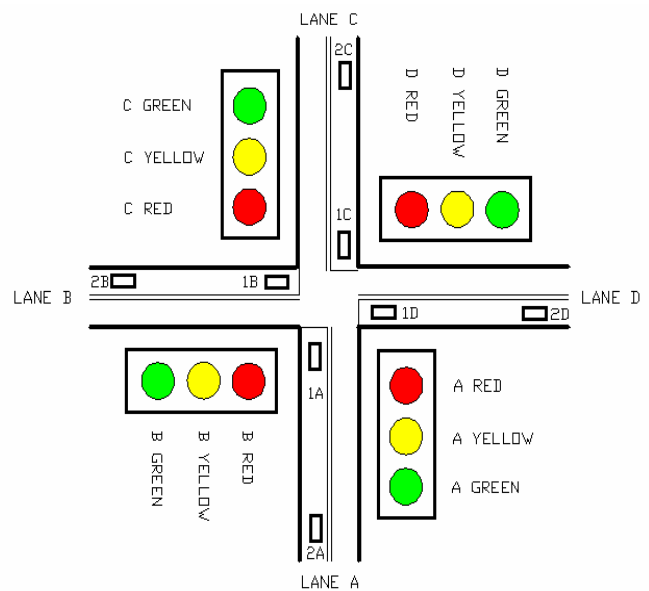
Through using VHDL language to the traffic light controller design, the traffic light control circuit uses digital signal automatic control to realize two groups of lights which are red, yellow and green. Those lights command vehicles and pedestrians passing safely at the crossroad, which bases on the data of traffic state transition.

Most of control systems are made by advanced PLC[11] (Programmable Logic Controller) technology, which even can effectively imitating the experienced traffic policeman’s thought. In addition, FPGA cannot compare the Anti-dry round benefit and fast speed benefit. However, PLC has a disadvantage for traffic light design. Most PLC costs more than \$400(could be 10 times of FPGA cost), which has not considered the expansion module.

The PLC technology is mostly used in heavy industry and Precision Instruments production. There are two kinds of

the VHDL design, which are modeling and synthesis. The modeling VHDL design has significant advantage in complicated system design.

In addition, the VHDL should not be thought as a programming language. This language is designed to describe the logic circuit. A classic model is a very helpful point to start programming the project.



**II. Proposed Work**

As we are preferring VHDL as our working language. We have to choose the option for it. This will help us to verify and run our code without any error.

There are many options for choosing the language. We can choose any language what we want. So in this case we have chosen VHDL for our project.

As we are doing our project on VHDL so we are choosing VHDL module. In the option file name we write the name of the project we want it to be. In the location option we

provide the area in which we want our project to be placed.

As the above figure tells us that we have to choose inputs and outputs for our project without inputs and outputs we won't be able to write our code and we will not get any of the output.

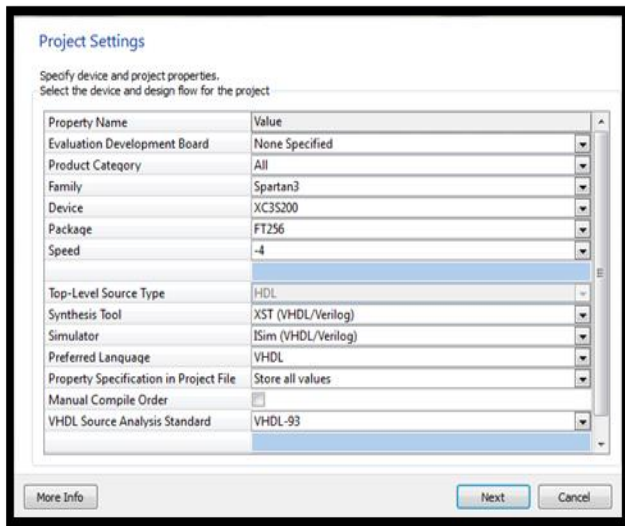


Fig1:- Specification of VHDL

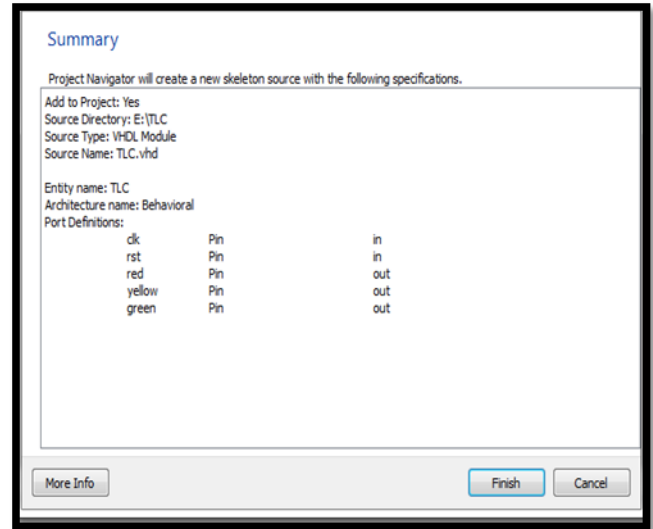


Fig 4:- Selection of Inputs and output.

### iii. Synthesis & Simulation Results

#### Block Diagram of RTL Schematic

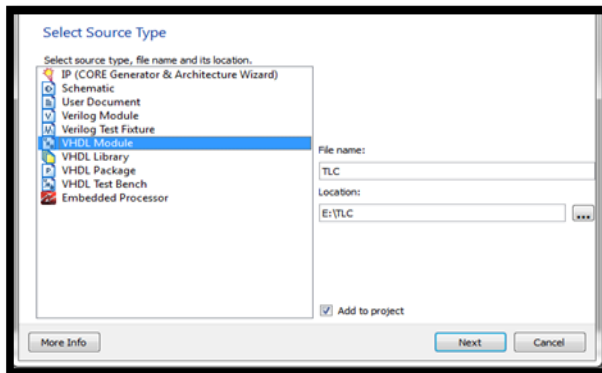


Fig 2:- VHDL Module

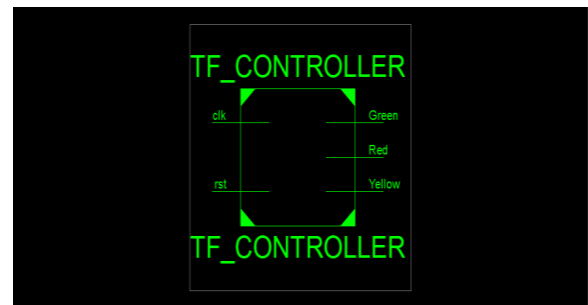


Fig 5:- Block Diagram Of RTL Schematic

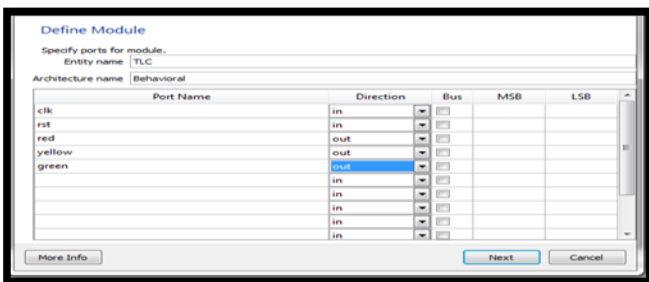


Fig 3:- Inputs and output

This figure tells us the schematic of our code or our program. We have just run. It tells us the inputs and the outputs of our code. This tells us that our program has been done and this could be our result.

### Circuit Diagram of RTL Schematic

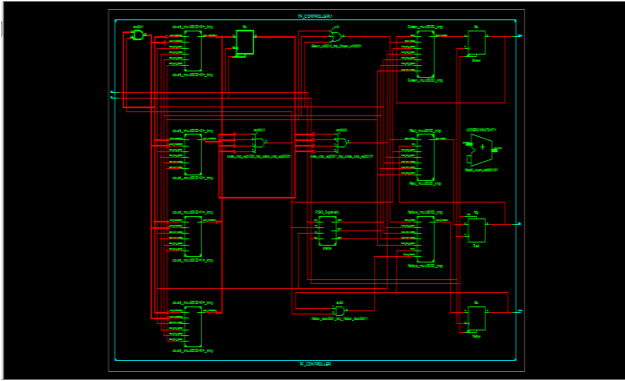


Fig 6:- Circuit Diagram of RTL Diagram

### Block Diagram of Technology Schematic

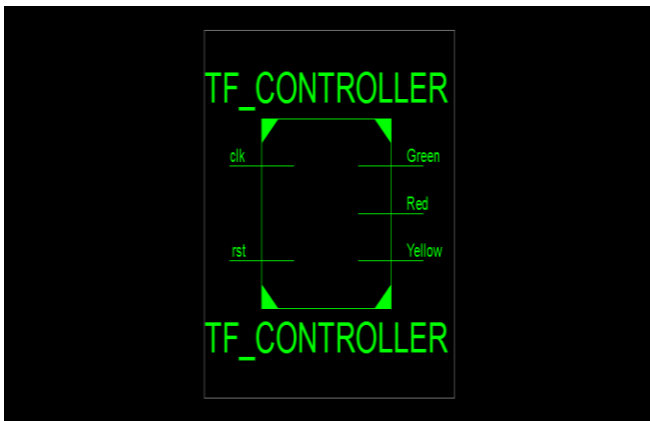


Fig7:- Block Diagram of Technology Schematic

### Circuit Diagram of Technology Schematic

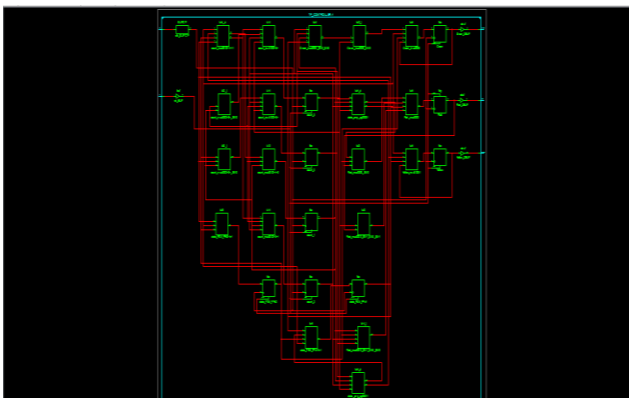


Fig 8:- Circuit Diagram of Technology Schematic

This is our final result. As our technology schematic. This contains truth table, k- map. We have done traffic light controller using VHDL based on FPGA..

### IV. Conclusion

Based on our work on traffic light control system using VHDL based on FPGA. We have implemented the code on XILINIX. For CPLD, we have successfully run our VHDL code. From our lab experiment. We have learned the theory and the code implementation of VHDL on the software. So, we have made the traffic light controller. It can be advanced further and synchronized more after experiments based on FPGA.

### REFERENCES

- [1] Department for Transport, General Principles of Traffic Jamming.
- [2] Robolab Technologies, "FPGA" [online]. Available from:[Accessed 07/01/2014].
- [3]John Catsoulis (May 2005). "VHDL", 2nd Edition. O'Reilly.
- [4]C.Alippi: traffic signaling, 2014
- [5]Bedini, S.A 2011, "VLSI".