AUTOMATIC LIGHT CONTROL SYSTEM FOR RAILWAY PLATFORM

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ABSTRACT

Rail road related accidents are more dangerous than other transportation accidents in terms of severity and death rate. Therefore more efforts are necessary for improving safety. There are many railway platforms which are unmanned due to lock of man power needed to fulfill the demands. Hence many accidents occur at such platform since there is no one to take care of the functioning of railway lights when the train approaches the crossing. The main objective of these project is to manage the light control system of railway platform by using VHDL. The proposed model has been designed using XC2S200 FPGA to avoid railway accidents occurring at railway platforms.

If implemented detection of train approaching the platform can be sensed by means of two sensors place on either side of platform. These work utilizes that two powerful IR sensor fixed at both sides of railway platform. We call the sensors along the train directions fore side sensors and the other has aft side. When fore side sensor gets activated ,the sensed signal is sent to the FPGA IC and the whole tubelights get 'ON' and stays 'ON' until the train crosses the platform and reaches aft side sensors and then half of tubelights get 'OFF'. Similarly we call the sensors along the train directions as a fore side sensors and the other as aft side sensor. When fore side sensor gets activated, the sensed signal is sent to the FPGA IC and the gate is closed and stays closed until the train crosses the gate and reaches after side sensors. When the side sensors get activated and the signal about the departure is sent to the FPGA motor turns in opposite direction and get opens and motor stop automatically.

Keyword: *Aft(After), DRC(Design Rule Checker), FPGA(Field Programmable Gate Array), IR(Infrared), VHDL(Very High Scale Integrated Circuits Hardware Description Language), VLSI(Very Large Scale Integration)*

1. INTRODUCTION

Now-a-days electronics plays an important role in a day to day life. Average people are related to electronics either as their profession or a hobby. Electronics deals with electronic devices and their application. Electronic devices are that in which electrons flow through a vacuum or a semiconductor. These devices have valuable properties, which enable them to function and behave as a friend of man. Today electronics has gained much importance due to it's numerous applications in industries. The electronic devices are capable of performing functions like: rectification, amplification, control, generations, conversions of electricity in line…etc. Within the last four decades we have witnessed a great revolution in the field of electronics. Electronics has provided a new Technology to the industries, which is widely spread than that of any other technology, in inventions. In electronics this new technology is better known as VHDL Design. These project is designed using VHDL to avoid railway accidents happening at unattended railway gates, if implemented in spirit. This project utilizes two powerful IR transmitters and two receivers; one pair of transmitter and receiver is fixed at upside (from where the train comes) at a level higher than a human being in

exact alignment and similarly the other pair is fixed at down side of the train direction. Sensor activation time is so adjusted by calculating the time taken at a certain speed to cross at least one compartment of standard minimum size of the indian railway. We have considered 5 seconds for this project. Sensors are fixed at 1km on both sides of the gate. We call the sensor along the train direction as 'fore side sensor' and the other as 'aft side sensor'. When foreside receiver gets activated, the gate motor is turned on in one direction and the gate is closed and stays closed until the train crosses the gate and reaches aft side sensors. When aft side receiver gets activated motor turns in opposite direction and gate opens and motor stops. Buzzer will immediately sound at the fore side receiver activation and gate will close after 5 seconds, so giving time to drivers to clear gate area in order to avoid trapping between the gates and stop sound after the train has crossed.

2. LITERATURE SURVEY

VLSI system can be implemented with the help of back-end and front-end tools. Approach of good designer towards in front-end is because of number of advantages over back-end tools like: Logical approach is more in front-end as compare to back-end, syntax rules are present in front-end whereas in back-end DRC rules are present,front-end is more flexible that means we can edit it fast but back-end is not that much flexible[1-2].Hence we are implementing automatic light control system for railway platform with the help of front-end tool that is Xilinx. To implement the automatic light control system for railway platform we can use different languages like assembly, Verilog… etc. but VHDL is the most powerful language as well as different modeling techniques can use so as to improve flexibility and performance of the system. Different modeling techniques of VHDL are Dataflow, Structural and Behavioral. In our implementation we are using behavioral modeling due to it's sequential execution and program syntax is easy as compare to dataflow and structural modeling [3-4]. We can use Altera, Atmel and Cortex-M are front end tools but that are used in industry level applications but Xilinx is used at academic level which is easy to understand at student level.

The proposed system can be referred as enhancement of current railway system converting the manned and unmanned railway light into automated railway platform light control system by using IR sensors. As we have seen that most of power get wasted on railway platform rather than other public sector.

Table-1:- Actual Survey of Railway Platform

Topics	No. of Equipments	Wattage Per piece (in KW)	Consumption(per day)
Tubes	450	40w/p	18
Bulbs	300	100	10.32
Fans	100	60	2.4 -9.6
Display Boards	020	---	---

From the Table-1 no. of equipments are present on the railway platform that contains tubelights,bulbs,fans, display board,..etc with their required wattage.Tubelights consume 18watt/day,bulbs consume 10.32watt/day…etc these much power is consumed.

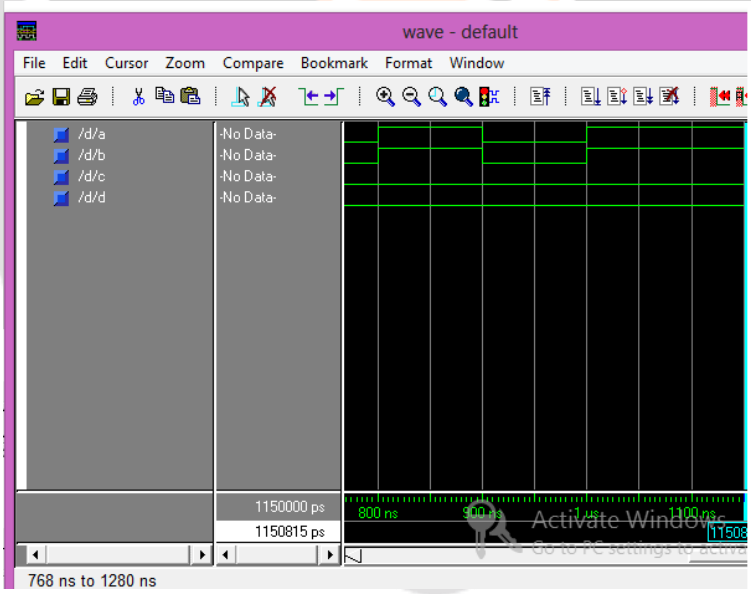
3. 3. SOURCE CODING AND RESULT WITH DISCUSSION

3.1 SOURCE CODE

```
Library IEEE;
use IEEE.STD_LOGIC_1164.ALL
use IEEE.STD_LOGIC_ARITH.ALL;
use IEEE.STD_LOGIC_UNSIGNED.ALL;
entity swtich2 is
```

```
Port ( a,b : in std_logic;                    //Describe the inputs//
c,d : out std_logic);                         //Describe the output//
end swtich2;
architecture Behavioral of swtich2 is
begin
process (a,b)                                 //Continuous input signal//
begin
c<=a;                                         //Defined conditions//
d<=b;                                         //Defined conditions //
if(a='1')  then                               //Input is high//
c<='1';                                       //Check the condition//
c<='0'after  10ns;                            //Output is low//
end if;                                       //End loop//
if (b='1')then
d<='1';                                       //Check the condition//
d<='0'after  10ns;                            //Output is low//
end if;                                       //End loop//
end process;
end behavioral;
```

3.2 RESULT WITH DISCUSSION



a and b act as a input,c and d act as a output. As per the given condition if a=1 then it will check the status i.e c<=1 if yes then it will send the signal to FPGA that is going to arrive on the platform after 10ns sec and then output goes low and remaining lights will turn 'ON'. Similarly it will check the status of input signal b if it is high then it will tells that train is going to leave the platform after 10ns then it will turn 'OFF' the lights.

4. CONCLUSIONS

As VHDL provides an wide range of modeling capabilities, it is possible to quickly integrate a core subset of the language that is both easy and simple to understand without learning the complex features. We successfully implemented automatic light control system for railway platform and observed it's output, both as test bench

waveform and on Spartan-II kit. The scope of this paper or project to be simulate the automatic light control system for railway platform using different simulation tools like Atmel, Altera and Cortex-M.

Calculations:-

N = No. of appliances=50
H = No. of Hours=12hrs
W=Wattage of tubes=36W
D=No. of Days=30days

$$\frac{NHWD}{1000} = UNIT$$

$$\frac{50*12*36*30}{1000} = 648 \text{ unit}$$

Billing = Unit*Commercial Rates

648*9.8=6350.4/- (Amount/Monthly)

By System Design

By using sensors, No. Of hours get reduced 50%. Therefore the no. of hours=6hrs.

Calculation:-

$$\frac{NHWD}{1000} = Units$$

N=50, H=6hrs., W=36W, D=30Days

$$\frac{50*6*36*30}{1000} = 324 units$$

Billing = UNIT*Commercial Rates

324*9.8=3175.2/-(Amount/Monthly)

Hence, the total power consumption and cost of electricity is saved by 50%.

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6. REFERENCES

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