

Design and Verification of Solar Powered Density Based Traffic Light and Automatic Street Light Controller

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Abstract— Saving electricity is the necessity in today's generation. Solar energy is the best for this purpose. It is a major renewable source and non-polluted. Hence, use of this energy is essential where the maximum possibility of utilization of solar energy is there. Hence automatic traffic light control system and solar powered street light system is made. Light detectors are used in the system for detecting sun light present or not, in this way we make street light to work only in the absence of sun light and save maximum power. This system not only saves power but also it reduces use of conventional energy. Proposed system is cost effective and the logic is implemented using Verilog.

I. INTRODUCTION

Traffic lights are used to provide a safe traffic environment for road users and pedestrians. Managing traffic is the biggest responsibility of a city. Traffic and street lighting is responsible for 38% of the total energy bill in cities. In developing countries, it is very important to save electricity and use natural or renewable resources instead of non-renewable resources.

By implementation of density based traffic lighting and automatic street lighting system, power consumption can be reduced. This system can not only save the electricity but provide better environment.

Hence, this paper is aimed to design an implementation of an automatic system to control the traffic and street lights and reduced energy consumption by using solar panels. The proposed system is able to control traffic and street lights.

II. IMPLEMENTATION

The block diagram shows the proposed system. Sunlight presence is detected by LDR sensor, which is shown in Brown colour. Density of traffic is detected by PIR sensors which are shown in Pink colour. LDR is used to switch on and off the street lights.

In Below Diagram TL is Traffic Lights. All the traffic lights are connected through Traffic Lights Controller which controls the traffic lights according to density and density is calculated by PIR sensors which is Passive Infrared Sensor. LDR which is Light Dependent Resistor used for detecting sunlight and according to LDR sensor Street Lights

(SL) will turn on or off. This system is connected through a battery and battery is connected with the solar panel.

Passive Infrared Sensor do not emit Infrared rays rather it accepts the IR rays coming from vehicles and its information is given to program.

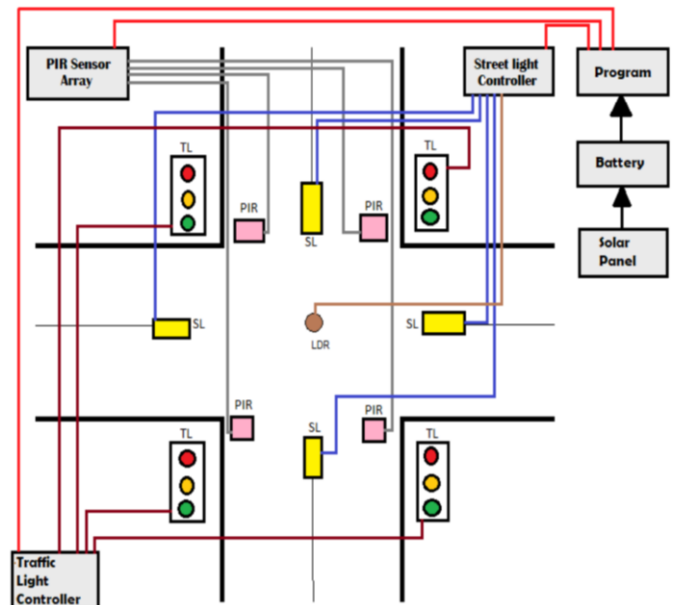


Figure 1 Block Diagram of Traffic and Street Light Controller

III. WORKING

The working of density based traffic lights and automatic streetlight is explained with the help of flow chart shown in figure below. By sunlight, the batteries get charged and with the help of batteries, the circuit can drive the traffic lights and streetlights. With the help of LDR sensor, the street light will glow only in the absence of sunlight and by the array of IR sensors, density of traffic is measured.

If density is equal on every side then the following sequence of green light will follow which is East → West → North → South. If density measured is not equal, then highest density side will be green first then remaining three are checked. From remaining three sides highest density side will

be green and this process continues until all the sides are covered. When one signal shows the green light then remaining three signals show red light for a specific time.

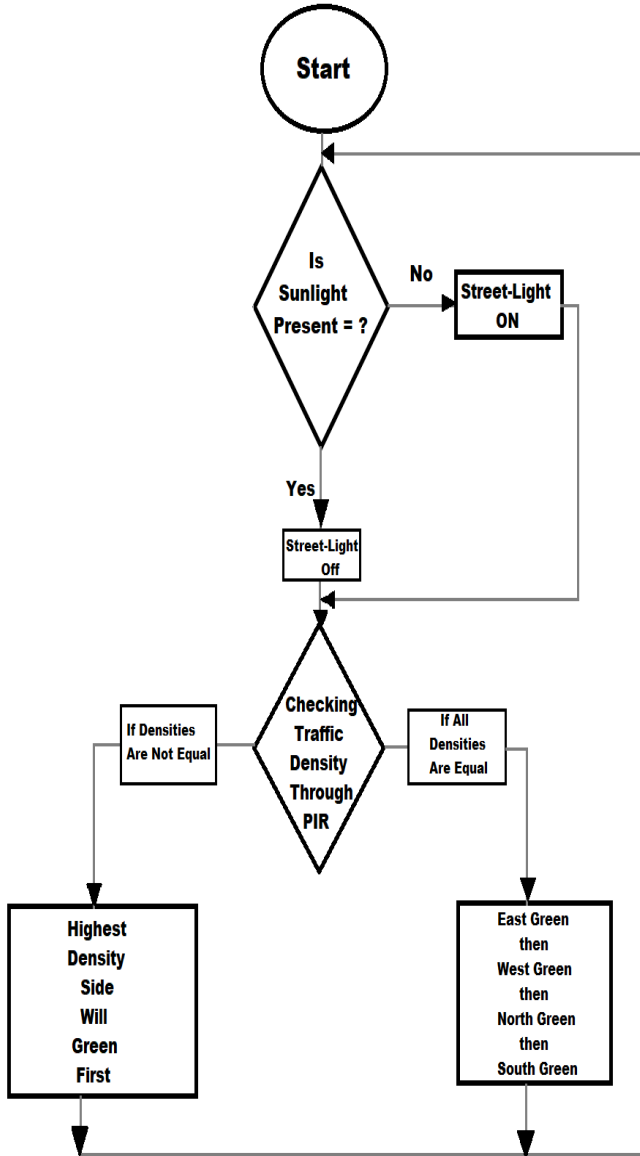


Figure 2 Flow Chart Traffic and Street Light Controller

IV. RESULT AND DISCUSSION

In this paper, we have formulated the scheme to design a traffic signal based upon traffic density and coding has been done. The simulation various situation of our program is done successfully through edaplayground.com and the simulation result waveform of density based traffic light and automatic street-light is shown in figure below.



Figure 3 Simulation Result of Traffic Light Controller

In above result de, dn, ds, dw is the density on east, west, north, south respectively and ge, gw, gn, gs, re, rw, rn, rs, ye, yw, yn, ys are green, red and yellow lights on east, west, north, south. Traffic on west side is greater that is why green signal of west side is on and red signal of remaining side is, on.

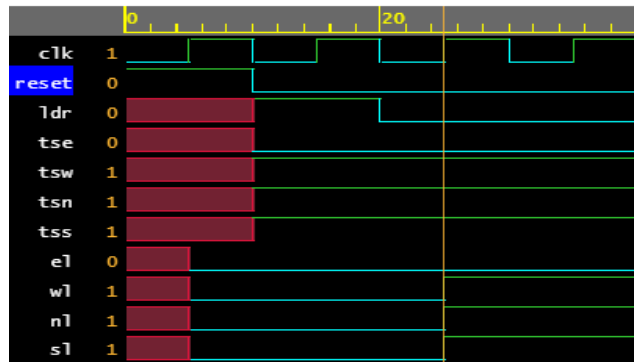


Figure 4 Simulation Result of Street Light Controller

In above result tse, tsw, tsn, tss is the traffic on east, west, north, south respectively and el, wl, nl, sl are street lights on east, west, north, south. In above result value of ldr is '0' which shows sunlight is not present and value of tse, tsw, tsn and tss is '0', '1', '1', '1' respectively which shows traffic on all sides except east is present. On the basis of ldr and traffic, streets lights on in west, north and south sides and off in east side.

V. CONCLUSION

Design and verification of Solar Powered, Density Based Traffic Light and Automatic Street Light Controller is done successfully. It can be implement on large scale to reduce power consumption and to manage the traffic in a better way.

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