

Design and Implementation of Automatic Street Light Control Using Sensors and Solar Panel

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Abstract

Solar Photovoltaic panel based street lighting systems are becoming more common these days. But the limitation with these ordinary street light systems is that it lacks intelligent performance. It is very essential to automate the system so that we can conserve energy as well as to maximize the efficiency of the system. In this paper a new method is suggested so as to maximize the efficiency of the street lighting system and to conserve the energy usage the LED lights sensors. Here automation of street lights is done by LDR sensor. Intensity of led street lights can be controlled by IR sensor and pulse width modulation.

Keywords: solar power, LED, LDR, IR sensor, street light control system, automation

I. INTRODUCTION

It is very common these days to see solar PV based street lights. People became aware about the importance of moving from conventional resources based energy production to renewable energy based power production. We all know that fossil fuel resources are going to feed us for only 50-60 years from now. So it is high time for us to shift to renewable energy based power production and usage as it is the only alternative available. It is sure that we can't leave in a society without power. So we need to maximize the usage of renewable energy so that we can preserve conventional resources. Normal solar PV based street lighting system lacks automation. The problem is that it will be in on state even though there is no need of light and hence it causes loss of power. Yet another problem is power is wasted during late night when there. In this paper a new technique is suggested to automate the entire system. Here when there is no necessity of light the system will go into a power down mode and the lamps won't glow. Sensors sense the intensity of light and presence sensor is used to detect the presence of humans or cars and then it gets turned on automatically.

II. PREVIOUS WORK

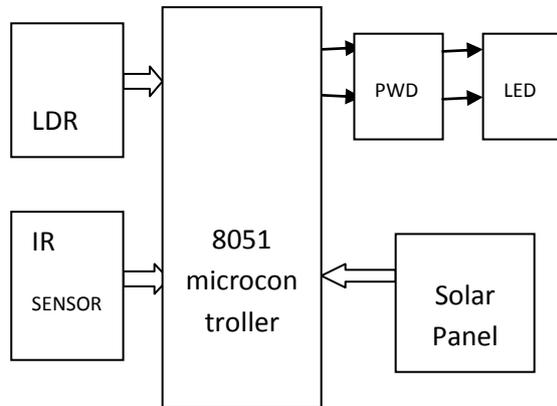
[1] MUSTAFA SAAD et al proposed paper on "Automatic Street Light Control System Using Microcontroller" "This paper aims at designing and executing the advanced development in embedded systems forenergy saving of street lights. Nowadays,

human has become too busy, and is unable to find time even to switch the lights wherever not necessary. The present system is like, the street lights will be switched on in the evening before the sun sets and they are switched off the next day morning after there is sufficient light on the roads. this paper gives the best solution for electrical power wastage. Also the manual operation of the lighting system is completely eliminated. In this paper the two sensors are used which are Light Dependent Resistor LDR sensor to indicate a day/night time and the photoelectric sensors to detect the movement on the street. The microcontroller PIC16F877A is used as brain to control the street light system, where the programming language used for developing the software to the microcontroller is C-language. Finally, the system has been successfully designed and implemented as prototype system.

[2]B. K. Subramanyam et al proposed paper on "Design and Development of Intelligent Wireless Street Light Control and Monitoring System Along With GUI" discussed that Now-a-days, it became essential for people work during nights and returning back to homes late nights; also increasing crime rate during night times. This can be best achieved by implementing proper solar based lighting system on Streets. The efficient monitoring and controlling of this lighting system must be taken into account. We will get more power consumption, saving money through solar panel. Also saving precious time, decrease the huge human power through from the LDR, IR Sensors. The Street lights are controlled through a specially designed Graphical User Interface

(GUI) in the PC. The Zigbee technology can be used for the street lights monitoring and controlling at the PC end.

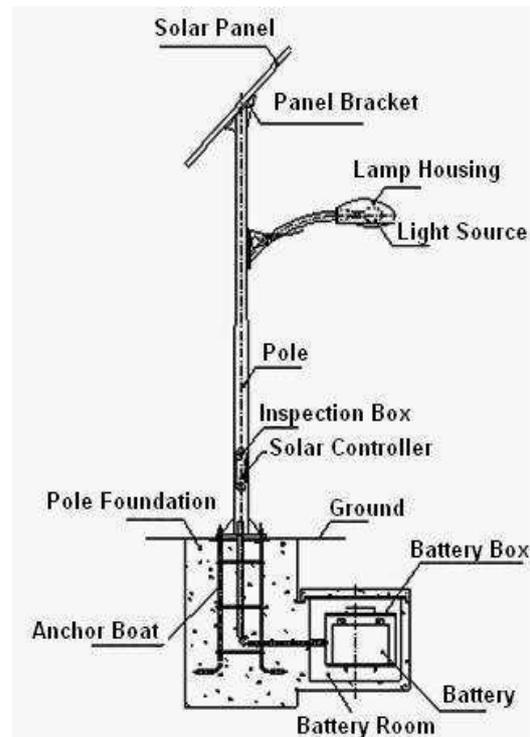
III. SYSTEM MODEL



i) Block diagram of proposed system

The block diagram of the proposed system is depicted in figure 1. Here we employ a microcontroller 80C51 so as to perform the controlling actions. We do employ certain sensors namely, IR sensor and LDR sensor. These sensors are connected to the ports of the microcontroller through an interfacing circuit and an amplifier. The output from the microcontroller could be viewed through an LCD display. The microcontroller generates a PWM which is fed to the LED driver circuit which changes the operating cycles of each LED in the LED Array.

The working of the entire system is mainly with the sensors present. The main idea behind the system is that the LED array will be in off position at day time. Even at day time if the intensity of light is lower due to weather conditions like fog, thunderstorm etc. then the array will get turned on. Presence sensor will detect the presence of any humans or cars. When IR sensor detects the vehicles brightness of the LED will be more when there is no vehicles brightness will be decreased. This is done so as to minimize the power consumption. Here we need light only when it is needed. At night sometimes roads will be empty and hence there is no use of illuminating all the lamps. So we can lower the intensity of LEDs and can conserve the power.



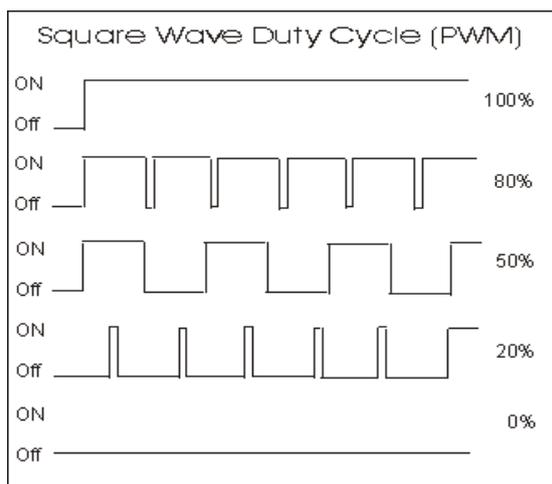
ii) Typical street light system

IV. PROPOSED METHODOLOGY

PWM is required mainly for intensity controlling of led .LDR is a light dependent resistor which is having very high resistance. Whose resistance decreases when light impinges on it. This kind of sensor is commonly used in light sensor circuits in open areas, to control street lamps. This LDR mainly used to different between day and night light. LDR gives the discrete output of the resistance values this analog should be converted into digital so an analog to digital converter is required which is interfaced with microcontroller .microcontroller is programed in such a way that it during morning and evening intensity increases or decreases so according to that intensity it is programed with 5 level intensity so we can conserve power here.

PULSE WIDTH MODULATION

IR sensor senses the vehicles on the street gives signal to the microcontroller. When vehicles are present it gives bright light. During late night low traffic density so brightness of the LED are automatically lowered .this dimmed light is enough for pedestrian. here also lot of the power conserved and we can utilize this power other purposes.



V. RESULTS

The prototype has been tested in variable real life conditions to verify the overall functionality and seek better performance. The measurements collected during the test phase allow calculating energy savings so that it is possible to estimate cost savings also for larger systems using approximations. Intensity of the street light can be controlled and we can conserve power effectively. we automated the street lights. It reduces the labor charge switching is done manually there is no need of human resource. Figure iv shows how intensities are controlled during late.



(a) light intensity low during no movement of vehicle



(b) when there will be vehicle high intensity bright light

VI. CONCLUSION

A new model is presented in this paper which will reduce the power consumption of the street lighting system about 20-35 % compared to conventional design. Here we are saving lot of power without any Wastage, by these advanced technologies we can design many more systems which can be done by solar lights and through these solar lights we have a vast usage at the same time we can do automatic systems instead of doing it manually like with LDR's. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.

VII. FUTURE SCOPE

Wireless is the buzz of communication industry today. The field of wireless communication is growing leaps and bounds day by day. There have been many advancements taking place in the semiconductor industry leading to more and more advancements in wireless technology.

The main aim of the project is to save the power, by using effectively we can save more power, as we know that there is shortage of power nowadays in everywhere mostly in villages etc. So to overcome that we can provide street lights automatically with the centralized intelligent systems. So in future we can design many more advanced technologies to save power.

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