Automatic Street Light Illumination Intensity Control Using LUO Converter

B. Balaji¹, V.G.Priyadharshini², R. Revathy³
¹²Assistant Professor, Department of Electrical & Electronics Engineering, IFET College of Engineering (Autonomous), Villupuram.
²UG Scholar, Department of Electrical & Electronics Engineering, IFET College of Engineering (Autonomous), Villupuram.

¹balaji.bc91@gmail.com, ²priya2711dharshini@gmail.com, ³revakrishnan89@gmail.com

Abstract. The paper deals with the control the street lighting according to the intensity of sunlight using LUO Converter. To improve the efficiency of system, IR sensor is used. IR (infrared) sensor is the device which is used to detect and measure the infrared radiation in the environment. Infrared sensor has two components in it and they are transmitter and receiver. The transmitter sends out the infrared radiation. The radiation hits out the object and returns back. The receiver in the Infrared sensor receives the infrared radiation. This received signal is used to detect and measure the object. LUO Converter is the DC-DC Converter which is used to boost up the input voltage. This system is to operate the street lighting system efficiently by using the Infrared Sensor, PIC sensor and the LUO Converter. PIC belongs to the microcontroller family which is made with the technology of Microchip. The PIC Controller is used to generate the PWM signal for the power converter. The power of the light depends on the duty cycle of the converters. In most of the converters, there is inductor coupled but this converter don’t have inductor, so that there is no channel inductance, so which high voltage with high productivity.

1. Introduction

The street lights are most important entity in the society for the purpose of security in present life and maintains the planned detachment from the misfortunes during the night time. The path illumination is the most significant and affluent need each and every place. Street Lighting system uses 10 to 38% of the utter vigour bill in run of the urban areas all over the world. Street Lighting is very basic need for the society in accounting with its main significance for financial security and the public security. This street lighting system plays the vital role in helping the people in all the aspects of security and the government by reducing the crime percentage and misfortunes in the society. It similarly strengthens communal incorporation by giving circumstances in which the individuals feel they can amble in long stretches of softness. In current scenario, most of the people in the society do not try to turn it OFF/ON when it is not needed. Extravagant lighting trashes huge financial possessions each and every year, and deprived lighting makes unsecured conditions in the society. Vital creative progressions and configuration can reduce the road lighting costs radically.

The basic thought in the current field advances are computerization, Power utilization and charge common sense. Computerization is proposed to lessen work with the assistance of watchful frameworks. Force sparing is the standard thought relentlessly as wellsprings of force are getting lessened because of different motives. Sorting out cost capable framework is vital as the fundamental is extra. To vanquish issue, customized road light regulation methods is presented. Rule target of undertaking is toward offer prevalent reaction for limit the electrical expenditure in working road illuminations, in period of robotization people energized and are not in a situation to manage the physical activities in whichever field, a brisk progression in installed frameworks takes liberated way for structure & progress from microcontroller centred changed regulated structures. Our undertaking offers a tweaked road light regulator utilizing light ward resistor (LDR). By utilizing this framework physical mechanism are taken out. The path illuminations are typically turned ON once the daylight drives underneath unmistakable domain of our senses. It typically executes the road illuminations.
under illuminating via daylight. It an unmistakable and convincing idea, turn ON/OFF, road light structure typically.

It in this way turns ON the lamp post once the daylight drives underneath the prominent area of our senses and switches OFF the streetlamp when satisfactory extent of light is accessible. Part utilized for illumination recognizing Light Dependent Resistor. Via utilizing IR can work the lamppost typically, once plentiful extent of illumination is accessible the streetlight will be in the OFF state and right when it is dull the light will be in ON state, it proposes IR obstacle is conflictingly similar with light falling on it. Precisely when the light falls on the IR it sends the solicitations to the control circuit that it ought to be in the OFF state and the streetlight murders. This undertaking mishandles the working of a semiconductor in submersion area and slice off zone to kill ON and switch the lights at genuine period with assistance of electromagnetically worked adjustments.

2. Literature Survey

2.1. Intelligent Street Lighting System Using GSM

Authors: K. Y. Rajput, Gargeeey Khatav, Monica Pujari, Priyanka Yadav

Regular road illumination structures in zones with a low rehash of spectators are connected a large portion of the dark minus reason. The outcome that a lot of influence is squandered ludicrously. With the extensive accessibility of supple illumination improvement similar light-conveying diode lights and wherever handy far off web connection, quick retorting, unfailingly operational, and force watching path illumination structures grow into genuineness. The motivation driving this effort is to depict the Brainy Path Illumination framework, a first strategy to oversee achieve the eagerness for supple open lighting structures.

2.2. Design and implementation of street light control using FM technology

Authors: E.V.Santhi

Road lighting is a fundamental piece of a metropolis's framework, the vital furthest reaches of which to enlighten the metropolis paths throughout the decrease ages of the diurnal. It is basic for people generally speaking and metropolis association to ensure turning ON/OFF the path lights. The basic thought for selecting this structure is accomplish ideal uses & lessening expenditure of power. Goal of this undertaking is for give a dependable framework to regulating countless road lights from a focal zone through FM talk with most raised consistency. The structure made will be made plans for presenting consistently cognizant and sound determination in a manner which is both in fact reachable and sensible. The undertaking fuses two phases to be express Communication headway and Power exchanging system. This undertaking unites conduction of coded DTMF signs to the FM transmitter via inaccessible headway by utilizing reverberation coupler for regulating path lights. Any of prevailing FM places can be utilized for imparting the hinted DTMF signal.

2.3. Automatic Street Light Control System Using Microcontroller

Authors: Mustafa Saad, Ahamed Salah, Abdalroof Abdaljalil

This paper targets sorting out & implementing the moved progress implanted outlines for essentialness frugal of path illuminations. These days, human has gotten superfluously included, and can't determine time even to regulate the illuminations any dwelling exorbitant. The current framework resembles, the path lights will be turned on dawn going before the sun sets and they are killed the following day sunrise after is adequate light in the city. Paper offers finest reaction for electrical force expenditure.

Labour-intensive development of the illumination framework is entirely gotten out. Here paper the 2 sensors are employed which are LDR sensor to show a day/evening time and the photoelectric sensors to perceive the improvement in the city. The PIC16F877A is employed as cerebrum to regulating the path light structure, the programming semantic utilized for stirring up thing to the controller is C-language. At long last, the framework has been effectively sorted out and executed as model structure.
2.4. Design and Implementation of Automatic Street Light Control System using Light Dependent Resistor

Authors: Gouthami. C, Santosh. C, A. Pavan Kumar, Karthik. A, Ramya.K.R

This paper targets sorting out and executing the moved progress in implanted outlines for essentialness frugal of path lights. These days, humanoid has gotten superfluously included, and can't discover period even to regulating the lights any location exorbitant. The current framework resembles, the road illuminations will turned on, the dawn going before the dawn& they, killed the following sunrise after is adequate sunny in the city. Paper offers the greatest reaction for electrical force depletion.

The physical development of the illumination outline is totally gotten out. Here the 2 sensors are cast-off which are LDR sensor to show a day/sunset time and photoelectric sensors to perceive, improvement in city. The PIC16F877A is employed as cerebrum to regulate the path light structure, where the programming linguistic exploited for stirring up thing to the controller is C-language. At long last, the framework has been effectively sorted out and executed as model structure.

3. System Design

The blocks of the structure is shown in fig.1. The System consists of Power transformer, Rectifier circuit, LUO Converter, Inverter, Street Light, PIC Controller & Driver Circuit connected with LUO Converter to drive the same efficiently and the IR sensor which is the main component in operating the system in energy efficient manner.

From fig.1, we can see, AC supply is fed into the transformer. A transformer is an inactive electrical device that moves electrical vitality starting with one electrical circuit then onto the next, or various circuits. The electrical energy from the transformer is fed to the bridge rectifier. A rectifier transforms Alternating Current (AC) to Direct Current (DC). The output DC voltage from the bridge rectifier is fed to the LUO converter. The LUO converter is utilized to support the info voltage. The supported DC voltage is control by utilizing PIC regulator. Yield voltage of the LUO converter is relies upon the recurrence of converter. The converter obligation cycle is shifted, the yield voltage likewise fluctuating.

Now the controlled voltage from the LUO Converter is fed to the inverter. An inverter is the device that converts direct current (DC) to Alternating current (AC). The gen voltage, vintage voltage and reappearance, and by and outsized power dealing with trust upon the structure of exact device. Now the AC voltage is fed to the street light. In this system, IR Sensor is used in this system which plays the important role in making the system energy efficient one. An IR sensor is a manoeuvre that measures & recognizes infrared radiation on general condition. Infrared sensor has two components in it and they are transmitter and receiver. The transmitter sends out the infrared radiation. The radiation hits out the object and returns back. The receiver in the Infrared sensor receives the infrared radiation. This received signal is used to detect and measure the object.

![Fig.1 Block Diagram](image-url)
4. System Operation
The LUO converter has one inductor, one force switch and two diodes. And furthermore has channel for lessen the sounds of the yield voltage. At the point when force switch is turned on inductor get invigorated and the voltage is goes to yield capacitor through diodes. The capacitor is release the voltage over the heap. The yield voltage is criticism to the PIC regulator. What's more, the PIC has set voltage and real voltage. The set voltage is fixed methods the yield voltage additionally equivalent to set voltage. The voltage esteem set by utilizing key capacity.

The PIC Controller is used for make the PWM beats for converter and inverter circuit. The PIC Converter beats are given to the driver circuit as data. Driver board is transcendently used to isolate and escalate the data indications of regulator beats. The driver circuit upgraded yield will be related with the central power circuit contraptions. The DC-DC converter changes over the low dc voltage into high dc voltage. Likewise, inverter changes over the dc voltage into cooling voltage. The fig.2. Shows the circuit diagram of Automatic Street Light Illumination Intensity control using LUO Converter.

![Fig.2 Circuit diagram of Automatic Street Light Illumination Intensity Control Using LUO Converter.](image)

4. Hardware Implementation
The work is actualized in a genuine framework. The pic regulator is used for make the PWM beats for converter and inverter circuit. The pic regulator beats are given to the driver circuit as data. Driver board is dominantly used to isolate and strengthen the data indications of regulator beats. The driver
circuit upgraded yield will be related with the central power circuit devices. The DC to DC converter changes over the low dc voltage into high dc voltage. Additionally, inverter changes over the DC voltage into cooling voltage. The fig.3. shows the model of Automatic Street Light Illumination Intensity Control Using LUO Converter.

![Fig.3 Hardware prototype of the System](image)

Fig.3 Hardware prototype of the System

![Fig.4 Duty cycle during the normal condition](image) ![Fig.5. Duty cycle during the object detection](image)

AC supply is fed to the system and the system starts to function. There are two waveforms shown below in fig.4 and in fig.5. one fig. shows the duty sequence during the normal condition and another fig. shows the duty sequence during detection of the object. The yielded waveform during the activity under typical condition (i.e) during the hour of zero location of the articles by the sensor is appeared in the fig.4. The yield waveform during the activity during the item location by the sensor is appeared in the fig.5.

5. Conclusion

The LUO converter is predominantly used to change over the low voltage sources to helpful voltage source. The sun powered voltage delivered is low voltage and the LUO converter is utilized to support the low voltage. With the goal that yield voltage of luo converter is utilized to control by PIC Controller. The advantages of LUO converter is High proficiency, Simple to control the speed and exchanging misfortunes are diminished. A SCDS dc-dc converter has the topographies of the planned SCDS converter are according to the accompanying: A clear structure, along these lines attaining a high-voltage gain with a little commitment cycle for the lessening of the conveyance loss of the power regulations, and a low-voltage weight on the MOSFETs and diodes. The working norm, continuous and discontinuous conduction way circuit examinations, and limit arrangement are obtainable. The general connection among the planned converter and added non-withdrew DC to DC converters are tended to.
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