International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Intelligent Street Light System

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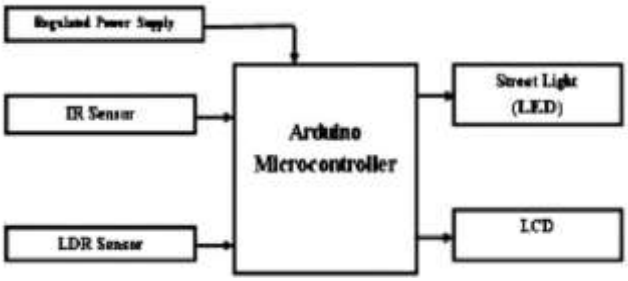
ABSTRACT –

The demand has been rising steadily in recent years. It has been discovered that lighting the streets uses a significant amount of electricity in several nations. The majority of basic street lighting systems are turned ON and OFF on a regular basis. The goal of this project is to create a street light energy-saving control system that will use less electricity when no vehicles are using a particular road. The proposed system saves a large amount of electrical power. In addition, it may increase the lifetime of the lamps. The operation of this system is to maintain the intensity of street lighting to 40% of the maximum intensity if no vehicles pass through the road. When the IR sensor detects movement of the vehicle, the street lights will be switched to 100% intensity. LDR is used in the system to detect day/night. One day is detected all the street lights will be in the OFF state. Arduino microcontroller is used to control the system.

The suggested approach makes significant electrical power savings. Additionally, it might lengthen the lamps' lifespan. If no vehicles are passing through the road, this system will keep the street lighting intensity at 40% of its maximum level. The street lights will be set to 100% intensity when the IR sensor notices movement of the car. The technology uses LDR to distinguish between day and night. It is anticipated that one day all the street lights will be turned off. The system is controlled by an Arduino microcontroller. The system has shown a great energy savings and if the system can be upgrade with many functions and user friendly the system can be commercialize and the cost for retrofitting the street lighting energy saving control system can be lowered. The main objective of this paper is to provide an intelligent traffic light control system in order to avoid the traffic congestion and to give a free way to emergency vehicles to reach their respective places without any delay. This system uses IR sensors to detect the vehicles density before signal. This will help the Arduino to change the signal timing.

Keywords: *Street light, Smart control, LDR, light intensity Arduino UNO, LDR, Relay, ATMEGA 328 IC ARDUINO Microcontroller, FMTR7R 27MHZ transceiver, IR sensor*

INTRODUCTION



The production of power is currently lower than the utility of electric energy, making it unable to supply consumers with electricity continually. The best way to conserve energy is to use street light monitoring systems, which use wireless sensor networks to remotely turn on, turn off, and dim lights. This extends the life of lamps while reducing maintenance and energy expenditures. We are all aware that street lighting is one of the crucial components of a city's infrastructure, with its primary purpose being to illuminate the streets of urban areas at night. The need for electricity is growing every day. Saving energy is crucial in the current environment. Since energy is produced at enormous quantity, the pace of energy consumption is also the same. And the non-conventional energy, which is running out faster than ever before, is primarily what produces the electrical energy. According to the current situation, either the same quantity of power has to be generated or the power consumption needs to be decreased because it is rising as a result of the demand. There are about 500 street lights along the national route, and each one uses about 150W. The street light is always on during the night and occasionally even during the day. In light of this, the energy usage will rise to 75000W when 500 street lights are taken into account. The following approaches, which are illustrated below, can help reduce the enormous amount of power use. The power consumption can be reduced by up to 30% utilising the first strategy, in which the street light illuminates in response to the vehicle's navigation on the National Highways. The second technique, which uses LDRs to detect the light, prevents the street light from glowing during the day. 20% less power is used as a result. Thus, these methods reduce electricity consumption by 50%.

BACKGROUND RESEARCH

The Street Light Glow system uses the most recent lighting technology, such as LED bulbs, to detect vehicle movement using a sensor. It is also used to build flow-based dynamic control statistics utilising infrared detection technology, regulate the automatic switching of street lights based on light intensity, and maintain wireless connection between lampposts and control terminals using the ZigBee Wireless protocol. It also incorporates a number of different technologies, including photodiodes, LEDs, power transistors, a timer, and statistics on the volume of traffic. The system in this study functions in automatic mode, controlling streetlight brightness and dimness as well as light intensity. Control can be implemented in accordance with seasonal variation. It has an automatic control and a timer function. For greater energy conservation, it has a time cut-out feature and an autonomous control pattern. The PIC microcontroller was used to implement the entire project.

MAIN PURPOSE

The goal of this study is to create a smart street lighting system with vehicle identification sensors that will offer a better way to cut down on electricity waste.

FUTURE SCOPE

The Arduino ATMEGA 328 micro controller is utilised in the traffic signal. Through the connector, a step-down transformer provides the electricity. In order to reduce the AC voltage from 230V to 12V, a transformer is necessary. A bridge rectifier is used to transform the stepped-down AC voltage into DC voltage. The filter is an electrolytic capacitor. To get the appropriate voltage, voltage regulators are used. The ac supply is then changed over to a dc supply using a bridge rectifier. The voltage regulator uses it after that to offer the microcontroller a steady dc voltage. Depending on the vehicles crowd the timing of the signals will change. The ARDUINO was used to programme the micro controller having timing control features. The RF receiver is fixed in the traffic signal control system to get the IR signal from ambulance having RF transmitter. The ambulance which emits the radio frequency of about 27MHz, continuously.

APPLICABILITY

A simple method of lowering energy use and CO2 emissions is to create a smart and dynamic street lighting system. This technology has the capacity to control flow in real time. Both infrared and PIR sensors are used in each sensing component to identify the flow. Two sensors are utilised in this to increase detection accuracy. These sensors are linked to the microcontroller that processes the data and controls the illumination. When a passerby is detected by a sensor, it will send a message to nearby street lights, which will make the area's lights brighter. When no activity is seen, the street lights will decrease to a low voltage level; when movement is seen, they will brighten to a high voltage level. Due to the growth of industries, this system would be crucial for saving the electricity without affecting the comfort zone. the schematic diagram of dynamic street lighting system with IR and PIR sensors in lane.

EXISTING SYSTEM

Dinesh Rotake is the author The Prof. Swapnili Karmore intelligent traffic light control system makes use of the outdated AT89S51 micro controller, which employs a genetic algorithm to determine the number of vehicles but is less versatile, has less internal memory, and is more expensive. The AT89C51, which is not flexible and has little internal memory, is used by the author Zhang Yuye. Cost will increase if a CAN BUS controller is used. The devices' utilisation will result in exceedingly complex designs. All of these issues will be resolved in our suggested system by utilising an Ardino ATMEGA 328 microcontroller, which consumes less power than an AT89S51. The author Shilpa S.Chavan , the operating time of traffic junction was fixed. It does not change according to the vehicles crowd standing before signal. For example if there is no traffic, the people will have to wait for some time until the traffic signal changes from red to green. For that they have use the GSM to find a solution. But it was not effective and has more complications. The proposed ITSC system solves this problem by using Arduino ATMEGA 328 micro controller with timer features, which changes the signal timing based on the vehicle density by using IR sensors. The author Ahmed S.Salamaet provide integrated intelligent traffic light system using photoelectric sensors distributed on long range before and after traffic light on roads. Sometimes the traffic signal has to open immediately for emergency cases. This system is capable of opening for one emergency vehicle to cross the signals. But it does not more effective for more than one emerging vehicle coming from various side of signal. This drawback is overcome in our proposed system. The rest of the paper is organized as follows. Section 2 gives the block diagram Section 3 described the proposed method and design.

SOLUTIONS AVAILABLE IN THE MARKET

The working of the model is very simple. The supply is given through the power jack. From the Arduino we take 5v supply and connect it to one of the terminal of photo resistor and other end is connected to a resistor of 10k which acts as a voltage divider and then final connected to ground. The output is given by output pin 13 of the Arduino which is connected to the led through a 220ohm resistor. The other end of LED is perfectly grounded. The LDR senses the amount of light in the atmosphere at that moment of time and accordingly sends the data is to Arduino .The Arduino converts the data received into various discrete levels.

PROPOSED SYSTEM

The LDR detects light and transmits the information to Arduino. Through the relay mechanism, the Arduino analyses the data and responds by controlling the LEDs. The Arduino is set up so that it automatically modifies the lights to provide the most accurate result possible.

ADVANTAGES OF THE PROPOSED SYSTEM

- *Automatic switching of streetlights*
- *Maintenance cost*
- *Reduction in CO_2 emission*
- *Reduction of light pollution*
- *Wireless communication Energy saving*
- *Reduction of manpower*

PROBLEM DEFINITION

It is very common to see the street light alight all night, which is a great waste of energy. The power consumption is relatively high day by day. Some streets are not fully occupied like the main city streets; sometimes they are empty for a certain period time. Based on the problem, the observation of street lighting was done to improve the street lighting control system to make sure the street light can operate properly. By applying this system, it can reduce energy consumption and also can reduce electricity wastage. Therefore it is important to know the ways how to minimize the power consumption of the street light.

REQUIREMENT SPECIFICATION

According to the density of movement, IR and PIR sensors are initially installed on both sides of the highways. The common microcontroller to which these sensors are attached. A single microcontroller is sufficient to carry out the job for a single street. The sensor transmits the signal to the microcontroller after sensing information about the lane's density. Each and every lane is equipped with sensors that allow for internal communication. The microcontroller retrieves the command from the sensor unit and evaluates the lane density to control the streetlight intensity. The microcontroller processes the data as per the flow chart. These processed signals are transferred to the lighting system in which the intensity of light is varied. It transfers the signal to the nearby light to perform the necessary action based on the movement.

CONCLUSIONS

This study describes a low-cost intelligent street light system that uses sensors to save electricity. IR and PIR sensors are used to test this dynamic street lighting system, and proteus7 simulation software is used to provide the results. The current global energy crisis can be somewhat alleviated by implementing this approach. The configuration and development of the Smart Street Lighting Control Framework Circuit are explained in this actualized concept. Circuit operates as expected to turn on and off traffic lights. Following the circuit planning that was described in the earlier portions, which controls the roadlight. The two essential elements needed for the circuit to perform as expected are an LDR sensor and IR sensors. If the two conditions are met, the circuit will perform the necessary function as specified by the specific system. The lighting or killing ON section is controlled by each sensor. Arduino successfully managed to control the traffic lights.

UNO. The lights will turn ON in the areas of the motions as directed by the controller. In addition, the road light system's drawback of relying on a photoelectric sensor has been overcome by using a timing controller. This control circuit can finally be used as a section of a lengthy highway connecting urban and rural locations. The goals of the project were to reduce the reactivity of the current street lighting system and find a solution for power outages. Setting up the inputs and outputs of the framework to control the street lights is the first step in this project. If implemented on a large scale, the model behaves predictably, will prove to be incredibly helpful, and will overcome all current constraints.

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