

SOLAR BASED SMART STREET LIGHTING SYSTEM

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ABSTRACT

Nowadays, human has become too busy and he is unable to find time even to switch the lights wherever not necessary. This can be seen more effectively in the case of street lights. 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 project gives the best solution for electrical power wastage. Also, the manual operation of the lighting system is completely eliminated.

In our project we are using LDR, which varies according to the amount of light falling on its surface, this give an indication for us whether it is a day/night time.

LED strips are operated and controlled by using micro controller NODE MCU.

Power supply to the components present in circuit supplied by solar panel in conjunction with battery storage.

INTRODUCTION

In this huge population world power is becoming as essential as human life. So, we cannot stop using power but we do not have sufficient power sources to be used. So, we have to reduce the wastage of power usage. In this project we consider present street lights controlling system because most of the power is wasted in this present process. This project aims at saving the electrical power up to maximum extent using sensors. In this competitive world, human cannot spare his time to perform his daily activities manually without any fail.

The most important thing he forgets is to switch off the street lights wherever not required. With this, even the power will be wasted up to some extent. This can be seen more effectively in the case of street lights and commercial sign boards. This project gives the best solution for electrical power wastage. Also, the manual operation is completely eliminated.

The project also works perfectly according to the seasonal weather conditions. The project uses LDR to read the intensity of the sunlight. The microcontroller takes the decision according to the sensor output. Thus, the microcontroller operated the lights by considering LDR output. We are using LED Strips to demonstrate the street lights working. And a solar panel is used to power up the entire circuit with the help of battery.

The main objective of our project is to avoid the wastage of power and to also to solve citizens problems facing mainly due to delay in switch ON and switch OFF the street lights. And made them operated automatically based on the light intensity.

Smart Controlling – Controlling of lights is taken care by the system itself. No addition support is required to control them. The control is based on the light intensity received by the LDR.

No Operating Cost – The operational cost of the system is nearly zero. Because, it won't take power from the grid. The system uses green energy(solar power).

More Intense Light – Instead of using normal bulbs, we use LED strip/ LED lights for street lights. So, by using this LED lights we can able to get more intense light.

Feasible for all areas – The system can be deployed in any kind of environment. It can also made possible to give the street light facility for remote areas as well.

Less Maintenance – As the system is automated and uses green energy to operate the maintenance cost is very low.

LITERATURE SURVEY

Some authors mentioned the use of LED DC road lights as opposed to conventional AC lights in view of their longer lifespan, higher effectiveness, lower support costs and mercury free, thus eco-friendly. Some others suggested that changing lights with LED will save 50% energy from the street lights. To control and manage the street lights several new technologies are being developing as of what many research end eaves in the writing talk about.

Tang, Hengyu [1] proposed a control core framework based on AT89S52 which controls street lights. This framework combines the various technologies of LCD, digital clock and a timer, photosensitive induction etc. when vehicles crossed by to conserve electricity the lights will turn on and vice versa. With this technology a large amount of power can be saved. In order to get the details of spoiled light and its information an auto-alarm function is used in this framework.

Xudan, Siliang [2] came up with a system with wireless sensor networks frame work to observe the progress. Based on latitude and longitude information the system is adjusted. Using sunset and sunrise procedures and the information of light intensity the system controls the street lights being kept in automatic programming mode. The system in addition makes use of digital temperature humidity sensor to humidity, real time and temperature of street lights.

Priyasree and Radhi [3] nominated control arrangement for a LED road lighting framework. The proposed control organization empowers disconnection of the road lighting framework from the mains amid pinnacle load time, lessening its effect in the distributed power framework natural utilization, decline the administration cost and screen the status data of every road lighting unit. A.C.

Kalaiarasan [4] volunteered a solar powered vitality-based road light with auto-following framework for augmenting power yield from a solar system that is desirable to increase the efficiency. So as to expand the power yielded from the sun light-based boards, one needs to keep boards lined up with the sun. by utilizing this approach, we can gain the maximum

utilization from sunrays. This is a far most financially savvy arrangement than buying extra solar panels.

Budike. E.S. Lothar [5] invented a lightening control system consisting of modules like ballast control module, data processing module. The data processing module is connected with number of repeaters. The connections between data processing module, ballast module, repeaters and computer system through wireless connection comprises of a local area network. This system is developed to give the benefits of operating and controlling light intensity, automatic running of street lights and scheduling through web browser.

S.H. Jeong [6] set forth the development of Control System for street lights using Zigbee communication system. This system is presented in order to reduce the difficulties in maintenance of the lighting systems as well as to decrease the uneasiness of handling the same. This is monitoring and control system of street lights which makes use of system's control command to make the street lights on and off automatically.

Rajput and katav [7] propounded an intelligent street lighting system to lessen the large amounts of power wasted in street lightening system. This system makes use of

different kind of sensors like CO2 sensor, noise sensor, light intensity sensor etc. To receive and send data between concentrator and system GSM modules are utilized.

Somchai Hiranvarodom [8] describes a similar analysis of photovoltaic (PV) road lighting framework in three distinct lights. To be specific, a low weight sodium light, a high weight sodium light and a fluorescent light have been utilized for establishment in every pole to decide the reasonable framework to introduce in a regular provincial zone of Thailand.

EXISTING SYSTEM

Industry of road lighting frameworks are developing quickly and going with fast development of industry and urban areas. Mechanization, Power utilization and Cost Effectiveness are the imperative contemplations in the present field of gadgets and electrical related advances. To administer and keep up complex road lighting frame of reference all the more financially, different road light control frameworks are created. These frameworks are created to control and diminish vitality utilization of a town's open lighting framework utilizing distinctive advancements. The current work utilizes the high-power release light

(HID). Stowed away by and utilized for urban road light and is dependent on rule of gas release, In this manner the power isn't been controllable by any voltage decrease technique as the release path is broken. HID lamps are a category of electrical gas remittance lamp which bring forth light by means of an electric arc in middle of tungsten electrodes resided inside a translucent or crystalline fused quartz or inter fuse alumina arc tube. Gas and metal salts are recycled to permeate the tube. The arc's fundamental opening is done with the benefit of gas. Once the arc is initialized, it heats and disperse the metal salts materializing plasma, the plasma thus generated greatly boosts the concentration of light emitted by the arc and power consumption is curtailed. Arc lamps belongs to the category of high intensity exoneration lamps. The existing system possess the main disadvantage of want of people to turn off and on the street lights to hand-operate which, requires formidable human competency to monitor the process. Also, we need to check regularly weather all the street lights are functioning properly or not. If the street lights stop functioning properly many accidents may occur. So regular monitoring of street lights is also required. We propose a contemporary

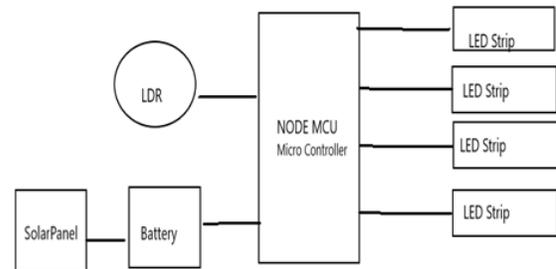
method of which reduces cost, human potential and energy consumption.

PROPOSED SYSTEM

The proposed system consists of Node MCU which is the central component. Which is used to control the led strips by using the analog signal which is send by the LDR sensor.

LDR a Light Dependent Resistor would work similar to human eye. Like if the light intensity it would be receiving is more then it works or it is in operating mode so it works on day time and allows the current to flow through it. But during night times or during low intensity time it will exhibits high resistance and does not allow the current to flow through it. So, by using this property of LDR we can control the street lights.

Based on the state of LDR the node MCU will operate the led strips which are connected to the output pins of controller. We use the solar panel to charge the battery and can use the stored power during night time. Battery is the main power source for the system and the led lights.



The central component of the block diagram is the Node MCU. Which is used to control the led strips by using the analog signal which is send by the LDR sensor.

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RESULT



If we provide LDR with more then lower limit of light the LED stop glowing



Under normal light which has intensity less then specified the LED starts glowing.

Advantages:

- The system is highly sensitive. When the light dependent sensor goes dark the LED becomes on when the sensor finds light the LED becomes off.
- Once the street lights are placed there is no need to monitor them anymore. They function on their own.
- They are less costly and are reliable.
- They can handle heavy loads up to 7A.

- According to the need the system can be changed to the manual mode.

Disadvantages:

- The automatic street light system requires a higher initial investment in comparison to conventional street lights.
- Generation of energy for solar street light entirely depends upon the climatic conditions.
- Risk of theft of the automatic street light system is relatively higher since they are non-wired & are much expensive.
- Rechargeable batteries of the automatic street light system are required to be replaced a few times.
- Snow, dust or moisture can accumulate of PV panels which can hinder energy production.

Applications:

Government Units & Municipalities – Government organizations can save large sums of money by using an automatic solar street light system for outdoor lighting. It is forecasted that we will have 359 million street lights by 2026.

Corporate & Big Businesses – Many companies nowadays are applying green energy technologies & practices to reduce their carbon footprint. Installing automatic street light system can prove to be a step in this direction.

Great Way to Light Up Streets – Apart from lighting up streets automatic solar street light system along with CCTV can also provide us additional security. Smart solar street lights are wireless & one of the street lighting solutions.

Along Roads & Highways – High-quality automatic street light systems can enhance night-time visibility on rural roads, main roads & highways. These are also very easy to install & are affordably priced.

Parks & Recreational Areas – Areas which are mainly donned by children can make good use of automatic street light systems. They are safe & secure & provide uniform lighting & the right amount of luminosity to parks.

Schools & Universities – Automatic solar street light system is an excellent choice for schools, colleges & universities. With plenty of accessible areas, ranging from bus shelters to parking lots institutions can install them throughout the campus.

CONCLUSION

The Streetlight controller using ldr based Light intensity & traffic density, in the todays up growing countries will be more effective in case of cost, manpower and security as compare with today's running complicated and complex light controlling systems. Automatic Street Light Controlling

System puts up a very user-friendly approach and could increase the power This paper elaborates the design and construction of automatic street control system circuit. Circuit works properly to turn street lamp ON/OFF. After designing the circuit which controls the light of the street as illustrated in the previous sections. LDR sensor and the photoelectric sensors are the two main conditions in working the circuit. If the two conditions have been satisfied the circuit will do the desired work according to specific program. Each sensor controls the turning ON or OFF the lighting column. The street lights has been successfully controlled by microcontroller. With commands from the controller the lights will be ON in the places of the movement when it's dark. furthermore, the drawback of the street light system using timer controller has been overcome, where the system depends on photoelectric sensor.

FUTURE SCOPE

With the advancement in science & technology future scope of automatic solar street lights is very bright. Demand for power affects human life in many ways.

It is not only important but essential to find ways to conserve power in order to prevent exhausting resources. Switching to a smart automatic street light system will also

reduce power wastage which conventional street lights are known to do.

REFERENCES

1. <https://www.researchgate.net>
2. [https:// www.intelizon.com](https://www.intelizon.com)
3. [https:// www.coolfiresolutions.com](https://www.coolfiresolutions.com)
4. Ch Kavitha, Swathi, Satya Prakash and Vinitha, "Solar Powered LED

Street Lighting with Auto Intensity Control", International Journal of Scientific & Engineering Research, July, 2016.

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