AUTOMATED CONTROLLER OF STREETLIGHT MANAGEMENT SYSTEM

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Abstract- *The information about finding the faulty street light automatically has become a vital milestone by using this technology. The primary goal of the project is to provide control and identification of the damaged street light automatically. The lighting system which targets the energy and automatic operation on economical affordable for the streets and immediate information response about the street light fault. Whereas in this proposed work using sensors these lights working status is easily captured without any manual interaction. So that it reduces manual efforts and the delay to fix problems. So, to reduce such problem we come with the solution wherein automatic detection of street light issues i.e.; whether the street light is working or not will be found at night time and it should send the notification to the authorised person if there is a problem in particular streetlight and also the location of the place where the streetlight is damaged. By adding solar panels, the overall power consumption and efficiency can be improved. Solar power allows to generate their own electricity, reducing reliance on traditional energy sources. Over time, this can lead to significant cost savings on bills. Additionally, replacing LED lamps with HID lamps will enhance the overall process. Moreover, implementing motion sensors allows for the variation of light intensity, thereby saving power consumption and enhancing efficiency.*

I. INTRODUCTION

In past days, we have been using the street lights. Those street lights need man power and they have to operate manually from time to time. As if the operating person was late for duty, then the lights will glow continuously up to morning, this leads to the wastage of electricity. In past days, if there is any fault in the street lights, it will be known only if and only if when the technician checks it manually. If in case of any delay in the process of technical check, it may lead to accidents.so, in order to overcome this problem, an iot based street light system has been introduced. In present days, we are using iot based system. The operation of this iot system is based on timers. These timers are Designed to ON and OFF at particular timings (e.g., 10pm-6am). But there are some limitations with this system when there are variations in between the sunrise and sunset (seasonal and climatical changes) *[1]*. Hence, a new IOT based system has to be introduced. In our proposed system, we have used LDR sensor to detect the presence of sunlight. By this, we can overcome the above discussed problems. In this system, we have also used IR sensor. Whenever there is a movement of vehicle/pedestrian, then the system is in active mode i.e., it glows brightly; else it is in dim position. If there is any failure in the street light, the circuit makes use of the Wi-Fi module. WIFI module sends the particular street light information to the control room. This will be very easier to spot the fault light and can resolve this issue at earliest. In winter and rainy season, there is no chance for adequate sunlight for charging the solar panels. So, we are alternatively using the piezo electric sensors and rotating speed breakers to generate the electricity*[2]*.The current manual streetlight system has several problems like maintenance issues,

timing problem, and connectivity issues. These problems can be resolved by IOT technology. The system is based on smart and weather adaptive automatic street lighting and management. Automation simplifies various problems in the world economy as well as in daily life. It uses the latest technology in LED as the light source to restore conventional street lamps such as HID lamps or High- Pressure Sodium Lamps etc. The LED lights are adopted because of its various advantages over existing technologies like power saving due to increased current luminous efficiency, reduced maintenance cost, high color rendering index, accelerated start-up, and durability. Nowadays flexibility of streetlight system is being highly challenged. Majority of the control runs in a manual setup whereas some are automated based on their surrounding parameters. Handling remote area location is the greatest dilemma. Manual mistakes can lead to energy wastage and lower the performance of the system *[3]*. The aim of this paper is to automate the streetlights to increase the productivity and accuracy of the system in a cost-effective manner and also permit wireless accessibility and control over the system. The main motive of the system is energy conservation because the resources like hydro, thermal, and coal that we rely upon are not easily replenished, so introducing power-saving elements like LDR Relays and LEDs can light up a large area with high-intensity light whenever needed. The relay is used as an automatic switch and reduces almost 100 percent of the manual work *[4]*. The main issue of the existing electric system is the connectivity problem as most of the connections handled by different contractors are done manually. Timer settings are performed manually. Timer often requires twelve hours continuous power supply and the further timer settings may be disrupted in the absence of continuous power supply. It reduces heat and carbon dioxide emissions. IOT-based street light automation is a cost-effective and eco-friendly method that also eliminates the problems in disposal.

II. METHODS

During day time. Solar panels use sunlight as a source of energy to generate direct current electricity and before storing it in a battery we have to convert the generated DC signal to AC. The sensors such as LDR and IR are connected to Arduino Uno. LDR sensor is used to detect the light source. If the surrounding environment is dark then. LDR resistance is very large. When it is under bright light. its resistance is low. A circuit that makes use of this change in resistance at different light conditions is able to switch the lights on and off automatically during night and day time respectively.

Whenever a vehicle /pedestrian/animal movement takes place on the road then the IR sensor detects that movement which in turn results, increase in intensity of street light. If there is no vehicle movement then the intensity of light decreases automatically. The street lights will be turned off automatically when there is a sunlight. If there is a failure in street lights then by using Wi-Fi module a message will be sent to control room regarding the failure, which helps in fast replacement of defected street Lights, which in turn reduces accidents. We are also using piezoelectric sensors and rotating speed breaker to generate electricity. When there are turning/ blind spot IR sensors detect the movement and indicates the signal to the opposite vehicle.

This type of street lighting has the potential to reduce energy waste and light pollution by efficiently lighting roadways with arbitrary shapes. The proposed adaptive device is an LED lamp that delivers a light pattern with the shape of the road, which maximizes illumination performance.

This luminaire adapts to the roadway just by simply replacing the cover plate, which is a structured microlens array sheet. Different aperture microlens units produce different shape light patterns. The adaptive mechanism is simple and effective: LED light is first collimated and then efficiently distributed on a freeform roadway by the special microlens array sheet. We presented an extensive analysis of the lighting adaptability of the proposed luminaire. In particular, we analysed the effect of key structural parameters of the microlens array in the optical performance of the LED luminaire. The analysis focused on the illumination distribution and the optical efficiency by using Monte Carlo ray tracing. We analysed how the main microlens structural parameters changed the shape and size of the delivered illumination distribution on the road. Finally, we examined a design example

of adaptive street lighting for a sharp curved roadway. This design used a non-homogenous lens depth distribution.

In order to test the concept, we constructed a prototype of adaptive street lighting set in our lab. The luminaire was scale constructed using down-size molding for the microlens array. Since the microlens aperture shape strongly determines the illumination pattern shape, our approach may be very suitable for future developments of dynamic adaptive lighting by flexible microlenses arrays with deformable apertures, or even by automatic mechanisms for interchanging plates.

It can also be connected up to 8 LEDs per system. And all the systems are connected to the internet and used to send and receive all the data the server and provides a central control to the managing board through web application and mobile apps. This IOT based automated streetlight system is very cost effective. The project aim is the conservation of energy. It can also eliminate the CO2 emissions and light pollution.

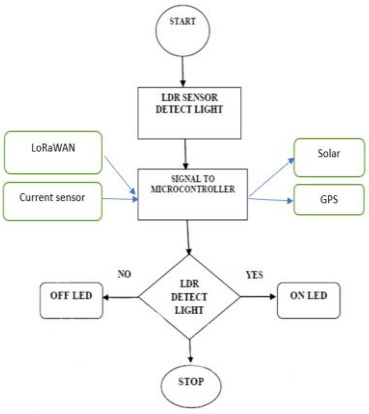

FIGURE 1. Block Diagram of proposed system Smart Street light.

The system does not require manpower and periodic check instead the system status is continuously updated. It is also helpful in getting the accurate temperature and humidity condition of a specific area. smart system. Which shows the status of the LEDs, power usage, intensity of sun light, sensor threshold, Temperature and humidity. It has advantages such as user-friendly, all data access in a single window interface.

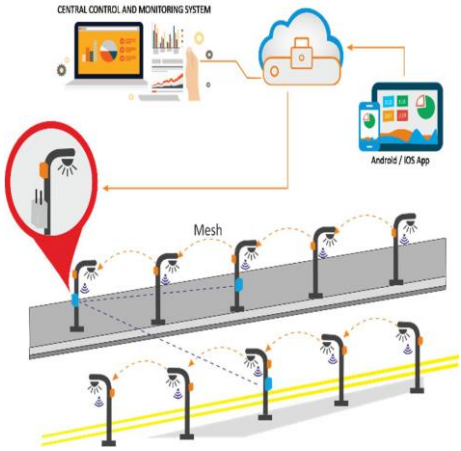

FIGURE 2. Proposed system of Smart Street light.

III. CONCLUTION

Nowadays resources are very precious. This work focused to protect one such resource i.e. energy. Electricity is one of the major losses of energy. Using IoT the street lights ON/OFF is automated based on the weather condition, the working status of the street light is observed. The LDR sensor senses the environmental changes, the ON/OFF of the street lights is made automatically. Whenever the street light got damaged or not on during night time, the LDR sensor senses it and sends the notification to the authorised person that the light is damaged and the location (using GPS) where the light is damaged. It reduces human efforts, delays in fixing the issues. The automatic control of street lights is used to find the exact location when the street light gets damaged. Solar panels offer a promising solution to reduce overall power consumption and enhance efficiency. Additionally, replacing LED lamps with HID lamps can further improve the overall process. Moreover, implementing motion sensors allows for the variation of light intensity, leading to reduced power consumption and enhanced efficiency. These measures collectively contribute to a more sustainable and cost-effective energy management system.

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