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Automatic Street Light

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Abstract: ***Traditional street lighting systems consume a significant amount of energy, leading to increased costs and negative environmental impacts. The demand for energy-efficient and cost-effective lighting solutions for streets and highways has increased in recent years. The given project focuses on to manage the amount of electricity used in public areas and to reduce labor. The research paper presents the design and working of an automatic street light system that uses LDR which detects the intensity of light and according to that it adjusts the lightening. The system decreases the costs by only lighting the areas where it is needed. The given paper offers a sketch of the different types of components used in the system such as LDR and microcontroller during day and night. The paper presents the results of experiments conducted to evaluate the performance of the system. The results showed that the system was able to accurately detect the intensity of sunlight and adjust the lighting accordingly. Ultimately, the paper focuses on the potential benefits of the system which includes improved safety for vehicles and reduced energy consumption. It also focus on some of the challenges that need to be addressed to deploy the system on a larger scale, such as the cost of the sensors and the need for maintenance. Overall, this research paper highlights on the feasibility and effectiveness of using automatic street lights controlled by a microcontroller to improve energy efficiency and reduce costs in urban areas.***

Keywords: Light Dependent Resistors (LDR), Light Emitting Diode (LED), Arduino Uno

I. INTRODUCTION

Lighting is an essential aspect of urban infrastructure, and street lighting is a critical component of ensuring the safety and security of pedestrians and vehicles. However, traditional street lighting systems are energy-intensive and can result in significant costs for maintenance for municipalities. Automatic street light control systems offer a solution to this problem by adjusting the lighting based on the ambient lighting conditions, resulting in improved energy efficiency and cost savings. The main purpose for the development of automatic street light systems is increasing demand for energy-efficient and cost-effective lighting solutions for streets and highways.

These systems use sensors to detect the presence of vehicles and pedestrians and adjust the lighting accordingly. Automatic street light systems have become an important area of research, as they have the potential to provide significant benefits for urban areas. Smart Solar LED Street Lights are a new and innovative solution to the problem of energy consumption and lighting in urban and suburban areas. Smart solar LED street lights can be controlled using various components, including Arduino, PIR (Passive Infrared) sensors, and MOSFETs (Metal-Oxide-Semiconductor Field-Effect Transistors). By taking a comprehensive approach to the design and implementation of smart solar LED street lights, urban and suburban areas can benefit from sustainable and cost-effective lighting solutions.[1] The use of Intelligent Street Lighting Systems (ISLS) has been gaining significant attention due to their potential to improve energy efficiency, reduce costs, and enhance safety in public areas. In this literature review, we will focus on ISLS that use GSM technology for remote monitoring and control. An intelligent street lighting system using GSM technology can be enhanced by integrating additional sensors such as smoke sensors, gas sensors, and sound sensors to detect and monitor environmental factors that affect street lighting systems. The control center can also monitor the system and receive alerts if environmental factors exceed safe levels, ensuring that the system operates safely and efficiently.[2] The development of an intelligent street lighting system using ZigBee technology provides a way of remotely monitoring and controlling street lighting. The ZigBee-based intelligent street lighting system includes a presence sensor to further enhance the efficiency and intelligence of the system by detecting the presence of people or vehicles in the area and communicates this information to the microcontroller, which can adjust the lighting accordingly.[3] An automatic street light using IR(Infrared sensor), resistor, Arduino, and LDR (Light Dependent Resistor) is a more sophisticated system that can provide reliable street lighting solution. This system is designed to turn on the street lights at dusk and turn them off at dawn, and it can also adjust the brightness of the lights based on the ambient light levels using an LDR.[4]

II. METHODOLOGY

A. Theory

An automatic street light is a device which uses sensors and technology to detect the vehicles on the road and it will automatically turn on or off light based on environment. But why automatic street light? what is problem with the conventional street light? we all know conventional street light are made up of high pressure sodium lamps which are not energy efficient and it consumes a lot of electricity due to which it is not budget friendly. Other than that conventional light are unable to switch off automatically in day because of which unnecessary energy consumption took place. The other advantage of Automatic street light is that it does not need man power due to which we can save our money. Now moving to the requirements of automatic street light. In street light we are using LED because of which we can save a lot of energy and it is budget friendly also. Automatic street light turn on automatically which reduces the risk of accident and can assure our safety. From this overall we can say that automatic street light provides efficient and effective solutions to the problem associated with conventional street light.

B. Materials

To implement the project we used the following hardwares:

1) LDR

Fig 1: Light Dependent Resistor

An LDR (Light Dependent Resistor) is commonly used in automatic street light systems to detect changes in ambient light levels and trigger the switching of the street lights on and off.

2) LED

Fig 2: Light Emitting Diode

LEDs (Light Emitting Diodes) are commonly used in automatic street light systems as they are energy-efficient, long-lasting, and require low maintenance.

3) Resistor

Fig 3: Resistor

Resistors are commonly used in automatic street light systems to limit the amount of current flowing through the circuit and to protect the components from damage due to excess current.

4) Jumper Wires

Fig 4: jumper wires

Jumper wires are commonly used in automatic street light systems to connect components and create electrical connections between them.

5) Battery

Fig 5: Battery

Batteries are commonly used in automatic street light systems to provide a reliable source of power in areas where access to electricity is limited or unreliable.

6) Arduino Uno

Fig 6: Arduino Uno

Arduino Uno is a microcontroller board that can be used in automatic street light systems to control and monitor the system's components and functions.

III. RESULTS AND DISCUSSIONS

By varying the street lights intermittently, the suggested system assists in intelligently and automatically controlling the street lights to reduce power consumption and manpower requirements. At the time of the strike, the current system, which is based on labour, is ineffective. The Arduino, which can be programmed to adjust the LED's brightness, is the essential component of the system..

IV. FUTURE SCOPE

Automated Street Lights is a cost efficient solution for cities working to minimize energy consumption boost public safety, and expedite further developments in digital infrastructure. Automated street lights can be fitted with a wide range of sensors and cameras to gather important information, assist cities in making educated decisions, and enhance the safety of cities for accidents.

V. CONCLUSION

The Street Light made by using Arduino uno can be coded again and again for controlling the LED and the Street light can be used in every season and at every situation like Solar Eclipse, Rainy season. The labor cost needed for switching on and off of the street light can also be saved.

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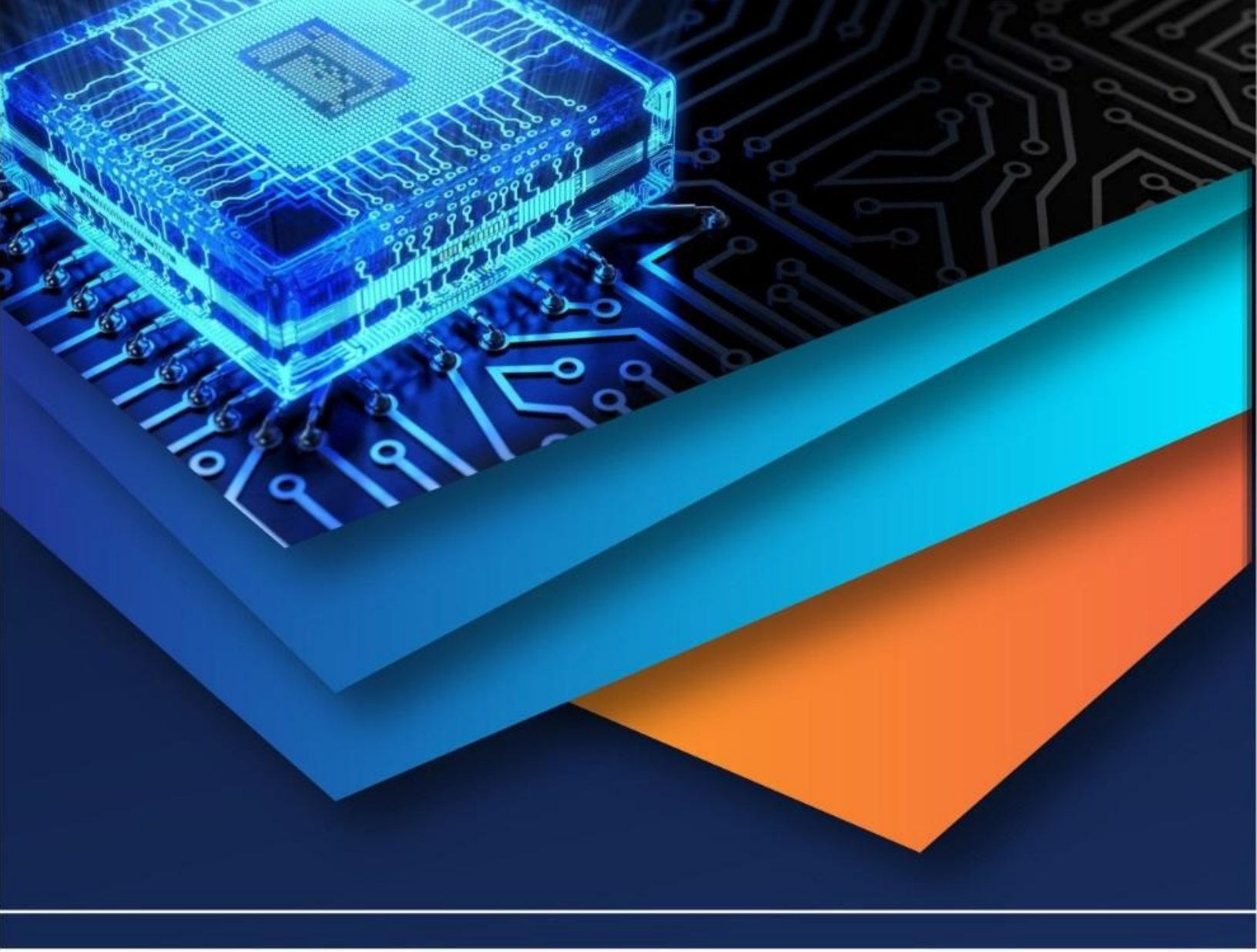

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