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AUTOMATIC LIGHT CONTROL

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Abstract: The main aim of the project is the development of light control which provides a solution for effective use of power or electricity. This project focuses on designing and building a prototype of a circuit which the ability to efficiently use electricity and control of light. This is built with sensors, interface with the Arduino code and operate on the various condition of sunlight available. The project emphasizes sustainability by using eco-friendly materials and a solar powered energy system and reducing the wastage of electricity itself. The circuit is built in such a way that the usability of long-term bulbs. Automatic night light control systems have gained significant attention in recent years due to their potential to reduce energy consumption and improve public safety. Automatic night light control systems, focusing on sensor technologies, control algorithms, energy efficiency, and applications.

Index Terms -: Automatic night light control, sensor technologies, control algorithms, energy efficiency, smart cities, street lighting.

I. INTRODUCTION

Automatic night light control systems are designed to optimize street lighting operations by adjusting lighting levels based on ambient light conditions, traffic volume, and other factors. These systems can significantly reduce energy consumption, lower maintenance costs, and improve public safety. The increasing demand for energy-efficient and smart lighting solutions has driven research and development in this area. Automatic night light control is a system designed to turn on or off lights based on ambient light levels or preset time intervals, improving convenience and energy efficiency. This system uses sensors like light-dependent resistors (LDRs) or motion detectors to detect when the surrounding area is dark enough to activate the light. It can also integrate timers or be connected to smart home devices, allowing users to set specific times for the light to turn on or off. This literature survey paper aims to provide a comprehensive review of existing research on automatic night light control systems, highlighting advantages and limitations of various approaches and identifying future research directions.

II. LITERATURE SURVEY

[1] "Smart Street Lighting System Using IoT and Machine Learning" (2020), It proposes a smart street lighting system that uses IoT sensors and machine learning algorithms to optimize lighting operations. The system consists of LED streetlights equipped with IoT sensors that collect data on ambient light levels, temperature, and humidity. The data is then transmitted to a central server, where machine learning algorithms are used to analyse the data and adjust lighting levels accordingly. The system also includes a web-based interface for remote monitoring and control.

[2]"Smart Street Lighting System using LDR and PIR Sensors" (2021) proposes a smart street lighting system that uses LDR and PIR sensors to detect ambient light levels and motion. This paper demonstrates the effectiveness of using multiple sensors to improve the accuracy and reliability of automatic night lighting systems. The use of PIR sensors to detect motion is also a key feature of this paper. Additionally, the paper highlights the potential of using wireless communication technologies to enable real-time monitoring and control of the system.

[3]"Automatic Street Light Control and Management using Solar Energy" (2022) presents a solar-powered automatic street lighting system that uses a microcontroller to control lighting operations. This paper highlights the potential of using renewable energy sources to power automatic night lighting systems and reduce dependence on non-renewable energy sources. The use of solar energy to power the system is also a key feature of this paper. Moreover, the paper demonstrates the effectiveness of using a microcontroller to regulate lighting operations and optimize energy efficiency.

[4]"IoT-Enabled Intelligent Lighting for Smart Cities" (2021) proposes an IoT-enabled intelligent lighting system that uses sensors and machine learning algorithms to optimize lighting operations. This paper demonstrates the potential of using IoT technologies and machine learning algorithms to create more efficient and adaptive automatic night lighting systems. The use of

IoT technologies to enable real-time monitoring and control of the system is also a key feature of this paper. Furthermore, the paper highlights the potential of using machine learning algorithms to optimize lighting operations and improve energy efficiency.

[5]"Automatic Dusk-to-Dawn Streetlight System Using GSM" (2020) presents a dusk-to-dawn streetlight system that uses GSM modules to remotely monitor and control lighting operations. This paper highlights the importance of using wireless communication technologies to enable remote monitoring and control of automatic night lighting systems. The use of GSM modules to enable remote control of the system is also a key feature of this paper. Additionally, the paper demonstrates the effectiveness of using a simple and intuitive control algorithm to regulate lighting operations.

[6]"Energy-Efficient Street Lighting Using LDR and PIR Sensors" (2020) proposes an energy-efficient street lighting system that uses LDR and PIR sensors to detect ambient light levels and motion. This paper demonstrates the effectiveness of using multiple sensors to improve the energy efficiency of automatic night lighting systems. The use of LDR and PIR sensors to detect ambient light levels and motion is also a key feature of this paper. Moreover, the paper highlights the potential of using energy-efficient lighting technologies to reduce energy consumption and improve public safety.

[7]"Implementation of Smart Solar LED Street Lights with IoT" (2021) presents a smart solar LED street lighting system that uses IoT technologies to remotely monitor and control lighting operations. This paper highlights the potential of using IoT technologies to create more efficient and adaptive automatic night lighting systems. The use of solar energy to power the system is also a key feature of this paper. Furthermore, the paper demonstrates the effectiveness of using a microcontroller to regulate lighting operations and optimize energy efficiency.

[8]"Smart City Lighting Solutions with ZigBee and LDR" (2022) proposes a smart city lighting solution that uses ZigBee and LDR sensors to detect ambient light levels and control lighting operations. This paper demonstrates the effectiveness of using wireless communication technologies and sensor networks to create more efficient and adaptive automatic.

[9]"Automatic Solar LED Street Light System with Motion Detection" (2023) presents an automatic solar LED street lighting system that uses motion detection sensors to control lighting operations. This paper highlights the potential of using renewable energy sources and motion detection sensors to create more efficient and adaptive automatic night lighting systems. The use of solar energy to power the system is also a key feature of this paper.

[10]"Automatic Solar LED Street Light System with Motion Detection" (2023) presents an automatic solar LED street lighting system that uses motion detection sensors to control lighting operations. This paper highlights the potential of using renewable energy sources and motion detection sensors to create more efficient and adaptive automatic night lighting systems. The use of solar energy to power the system is also a key feature of this paper.

III. RESEARCH METHODOLOGY

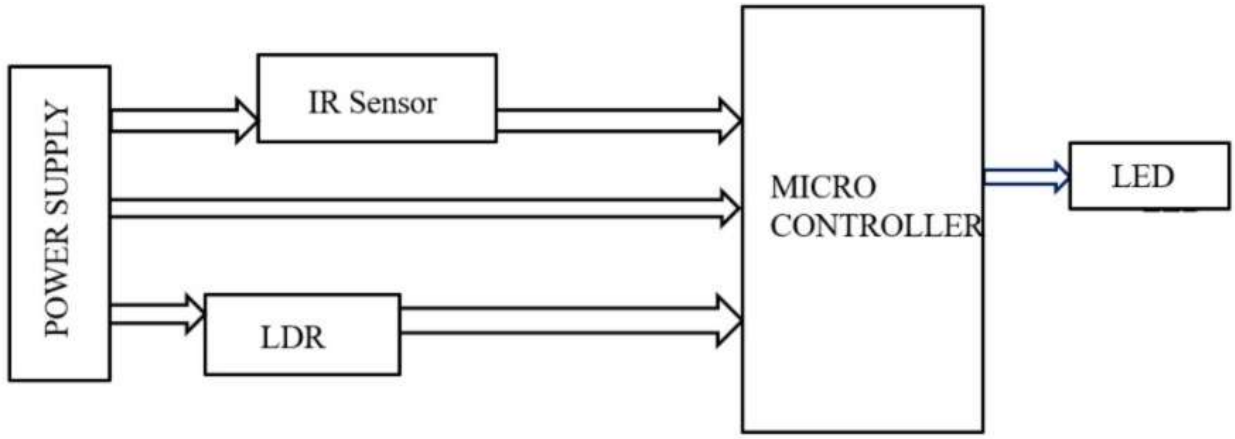

Fig 2: Block Diagram Of An Automatic Light Control

A. BLOCK DIAGRAM

Figure 1 represents the block diagram of automatic light control system using Arduino in which we used the components like IR sensor, LDR, LED.

B. WORKING

The Automatic Light Control for Home Automation system works by integrating an IR sensor (PIR), an LDR (Light

Dependent Resistor), and an Arduino microcontroller to intelligently manage lighting based on motion and ambient light levels. The IR sensor detects motion within a room by sensing infrared radiation from human body heat. When motion is detected, it sends a signal to the Arduino, prompting the system to check the ambient light conditions using the LDR. The LDR measures the amount of natural light in the room; if the ambient light is below a certain threshold (indicating it's too dark), the Arduino activates a relay to turn on the light. Conversely, if no motion is detected, the system automatically turns the light off to save energy.

Additionally, if motion is detected but there is enough ambient light, the system prevents the light from turning on. This dynamic, automated process ensures that the lights are only on when necessary, enhancing both convenience and energy efficiency in a home environment.

C. FLOW CHART

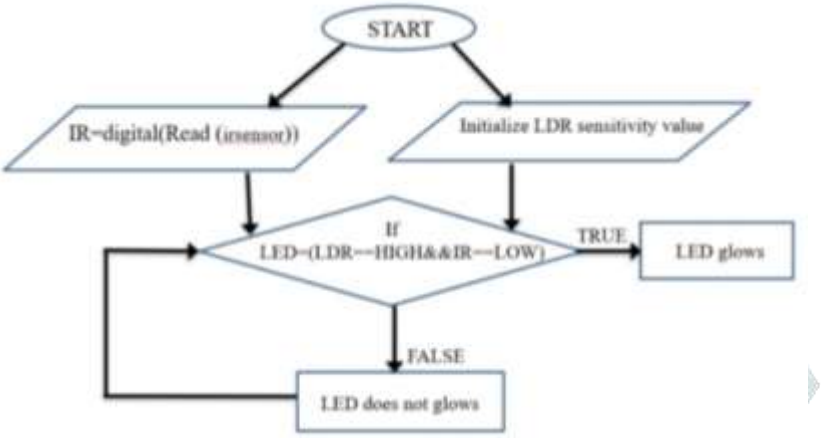

Fig 3: Flow chart of an Automatic Light Control

This flow chart describes an automated process for controlling an LED light with the outcomes of both LDR and IR sensor.

Start: The process begins with a start node.
Initialize LDR sensitivity value: This step sets the sensitivity threshold for the LDR (Light Dependent Resistor), which measures the ambient light level.
IR = digital(Read(irsensor)): The process then reads the value from an IR sensor, which detects the presence of infrared light.
If LED = (LDR = HIGH && IR = LOW): The process checks if the LDR reading is high (indicating low ambient light) and the IR sensor reading is low (indicating no infrared light).
True: If both conditions are met, the LED glows.
False: If either condition is not met, the LED does not glow.

IV. RESULTS AND DISCUSSION

The prototype of the proposed system is shown in figure 1.

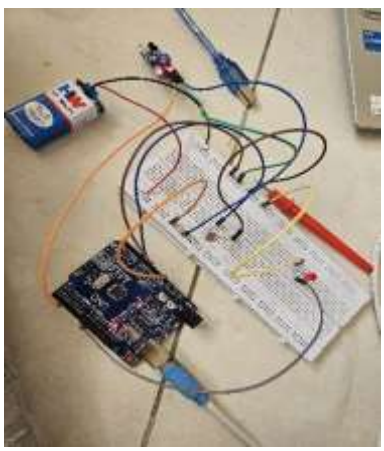

Fig1: System of the project with the complete connections

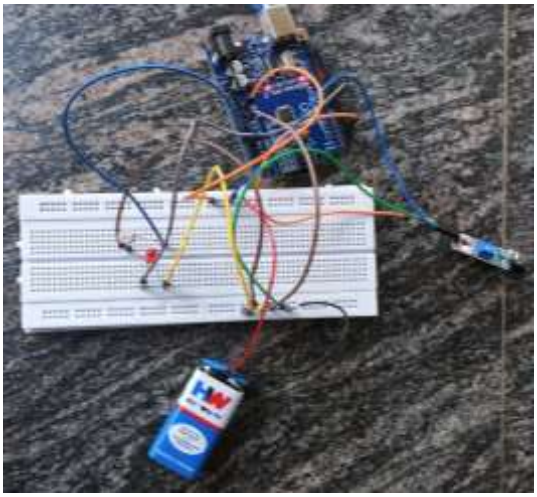

Fig 4: When there is no motion during day, LED is OFF

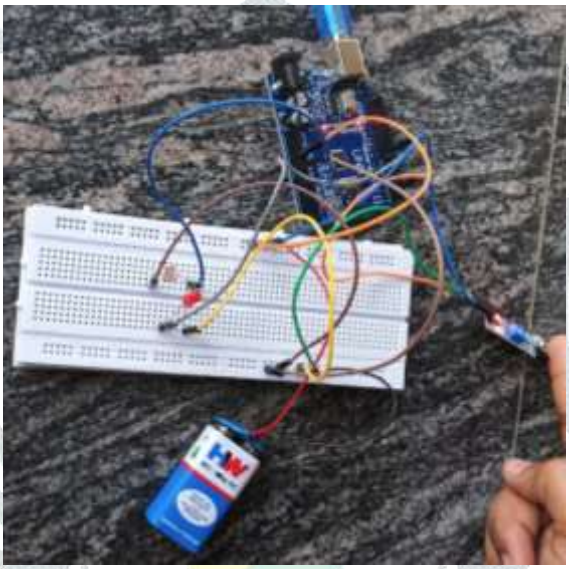

Fig 4: When there is motion during day, LED is OFF

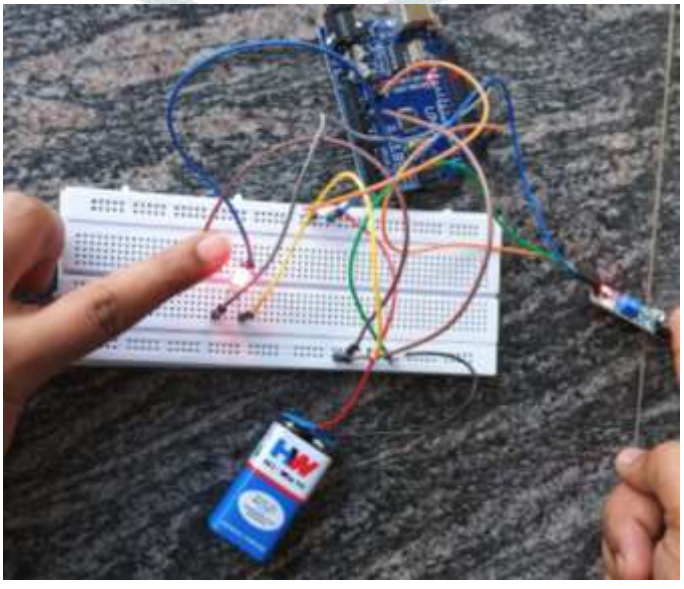

Fig 5: When there is no light (night) and there is a presence of motion , LED is ON

Table 1

Fig no.	Figure Name
1	Circuit Diagram of a system
2	Block Diagram of a system
3	Flow Chart
4	RESULTS: When there is no motion during day, LED is OFF
5	RESULTS: When there is motion during day, LED is OFF
6	RESULTS: When there is no light (night) and there is a presence of motion , LED is ON

V. ACKNOWLEDGMENT

We would like to express our sincere appreciation for the development and installation of the automatic light system for nighttime use. This innovative system has significantly improved visibility and safety during the dark hours, providing comfort and convenience to all users. Its efficient design, which activates based on ambient light levels, ensures that the space is always well-lit when needed without unnecessary energy consumption.We recognize the hard work and dedication involved in implementing such a forward-thinking solution, and we are confident it will continue to enhance the experience of those who rely on it. Thank you for your contribution in creating a safer and more user-friendly environment for all.

VI. REFERENCES

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