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IoT Enabled Street Light with Auto Intensity Controller and Fault Detection

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Abstract - The aim of IoT Based Street Light Monitoring is the conservation of energy by reducing electricity wastage as well as to reduce the manpower. The Saved energy can be utilized in various purposes like residential, commercial etc. This is done by using the LDR sensor. Here the LDR sensor is used ON-OFF the street light based on the ambient intensity level. It is an uncomplicated light/dark activated switch and contains a relay at its output. This switching can be done by a low-cost Wi-Fi module ESP 8266 01 after reading the LDR value. The real time information of the street light (ON/OFF Status) can be accessed from anytime, anywhere through internet. It ensures high reliability and excellent long-term stability. This work is implemented using a programmed Microcontroller AT Mega 8266 board for providing the required intensity of light at various times. The proposed work has achieved a better performance compared to the existing system.

***Key Words*:** IoT, Smart Lighting, Auto Intensity, Fault Detection, Energy Efficiency, Street Light.

1.INTRODUCTION

The advancement of Internet of Things (IoT) technology has paved the way for the development of smart city solutions that enhance energy efficiency, improve urban infrastructure, and promote sustainability. This project focuses on creating an IoT-based street light monitoring and EV charging point system using Microcontroller AT Mega 8266 and the ESP 8266 01 WiFi module. By leveraging these technologies, the system aims to provide intelligent street lighting control, efficient energy management, and convenient EV charging facilities. The Microcontroller AT Mega 8266 serves as the central microcontroller, orchestrating the functions of sensors and actuators. The ESP 8266 01 WiFi module provides wireless connectivity to the ThingSpeak IoT platform, allowing for real-time data transmission and remote control. Key components include a relay module to control the street light LED and EV charging point, a solar panel to convert solar energy into electrical power, and a battery with a regulator to store and stabilize this energy. The LDR sensor detects ambient light levels, enabling automatic switching of street lights, while the temperature and humidity sensor monitors environmental conditions to optimize system performance. Power is managed through the solar panel, which captures and stores energy in a battery regulated for consistent supply. Data from the LDR and temperature/humidity sensors are processed by the Arduino, which uses the ESP 8266 01 to communicate with ThingSpeak. The relay module controls the street light LED based on ambient light conditions to conserve energy, and the EV charging point is integrated with the system for centralized control and efficient operation.

2. Body of Paper

2.1 System Architecture

Explain block diagram, major components (LDR, IR sensor, ESP 8266 01, Voltage Converter, LED street lights).

2.2 Working Principle

- Auto-intensity control using LDR
- Fault detection via current sensor
- IoT interface using ESP 8266 01 + Blynk/ThingSpeak
- Alerting system (Email/notification)

2.3 Hardware and Software Requirements

- Arduino IDE, ESP8266 WiFi module
- Sensors, microcontroller board, WiFi access

2.4 Results and Observations

Include a table or chart with:

- Power consumption before and after
- Number of faults detected
- System uptime

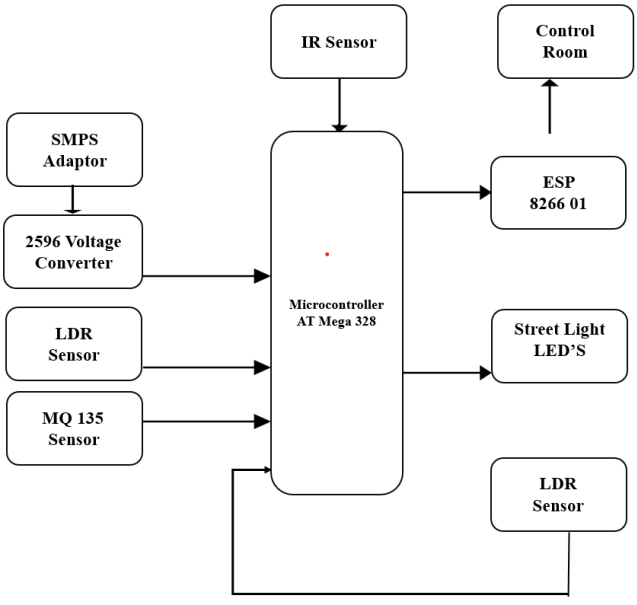

Fig -1: Block Diagram

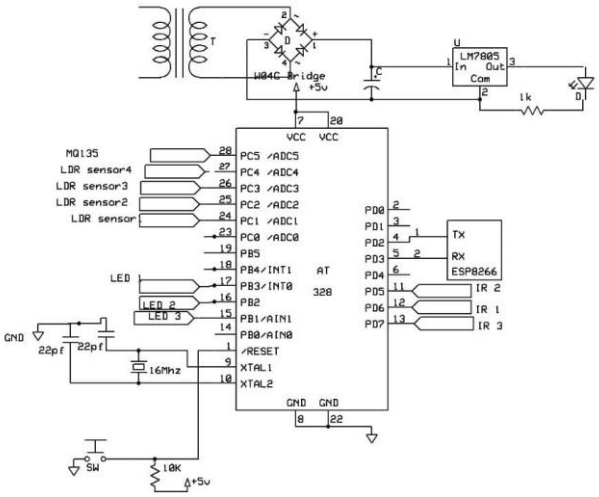

Fig -2: Circuit Diagram

3. CONCLUSIONS

An automatic street light control and fault detection system with cloud storage in this paper, control the street light ON/OFF automatically depends on the environment situation and we can easily identify the light faults in this system easily and also the system sends alert message to the authorized person's mobile numbers. We can monitor the system anywhere and anytime via cloud storage system. This system is very useful to Municipal Corporation. In, Future we will find the sensor's faults and power supply faults in the system and also we will control the light power adjustment depends on the environment. So, we've come to the conclusion that this project's hardware and software architecture fulfil the design target. The Microcontroller AT Mega 8266 was used to successfully create a working prototype of a street lighting automation scheme. Usage of LDR and IR sensor as the input, gives energy saving to the system since LED turn ON only when there is a dark and movement of objects, thus, the usage of power consumption by street light decreases. An automated street light control and fault detecting system that automatically turns on and off-street lights based on input conditions. We can quickly distinguish light faults in this system, and the system even sends a warning message to the controller.

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