Internet of Things (SYNOPSIS)

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Introduction

Smart Energy Management System for IoT is a project aimed at developing an intelligent energy management system that can effectively monitor, control and optimize energy consumption in smart homes, buildings, and industries. The system will use Internet of Things (IoT) devices such as smart meters, sensors, and actuators to collect and analyze energy data, and then make intelligent decisions to manage energy usage and reduce waste.

The project will involve the integration of several technologies such as machine learning, artificial intelligence, and cloud computing to create an intelligent system that can learn from past energy usage patterns and make predictions on future energy demand. The system

consumption, set energy usage targets and receive alerts when they exceed their energy budget.

The proposed system will offer several benefits, including reducing energy waste, lowering energy bills, increasing energy efficiency, and reducing carbon emissions. It will be designed to be user-friendly and easily deployable, with minimal installation requirements, making it accessible to a wide range of users.

HARDWARE COMPONENTS:

1. IoT sensors (e.g., IR 08H, INA219)
2. Microcontroller (e.g., Raspberry Pi)
3. Power source (e.g., batteries or AC power)

SOFTWARE COMPONENTS:

1. Thorny IDE

OBJECTIVES:

The objectives of a Smart Road Light Management

follows:

1. Energy Efficiency: The system aims to reduce energy consumption by using LED lights that consume less energy and adjusting the brightness of the lights based on traffic conditions, weather conditions, and other factors.

2. Cost Savings: The system can help reduce the costs associated with public lighting by automating the management of the lighting system, reducing maintenance costs, and minimising the need for manual intervention.

3. Safety: The system aims to improve road safety by providing better lighting in areas with high traffic volumes or accident-prone areas. The system can also alert authorities in case of a malfunctioning light.

4. Sustainability: The system aims to reduce the carbon footprint by using energy-efficient LED lights and optimising the lighting schedules based on demand.

5. User Experience: The system aims to improve the user

by providing better lighting in areas where it is needed, reducing light pollution, and improving the overall quality of the lighting.

STEPS:

- Install IoT sensors on electrical devices such as air conditioners, lights, and refrigerators to collect real-time energy usage data.

- Connect the sensors to the microcontroller using Wi-Fi modules.

- Write code in Arduino IDE to read sensor data and use the MQTT protocol to send data to the cloud-based server.

- Set up a cloud-based server to receive and process sensor data. This server can also store historical data and generate alerts when energy consumption exceeds a certain threshold.

- Use a data visualisation tool like Grafana to display the

consumption, and use machine learning algorithms to predict future energy usage.

• Develop algorithms to control energy consumption based on the data and insights gathered. This could include automatically turning off lights or air conditioning when they are not in use or adjusting temperature settings based on occupancy.

EXPECTED OUTCOMES:

• Reduced energy consumption and costs.
• Improved efficiency and sustainability.
• Real-time monitoring and reporting of energy usage.
• Better allocation of resources based on data-driven insights.

POSSIBLE EXTENSIONS:

• Incorporating renewable energy sources such as solar panels or wind turbines to the system.
• Integrating with smart home automation systems to control energy usage based on occupancy and user