SMART ENERGY METER AUDITING WITH POWER DEMAND CONTROL USING IoT

INTRODUCTION:

This project focuses on developing a **Smart Energy Meter** leveraging IoT technology to revolutionize traditional energy metering systems. Unlike conventional mechanical meters, this system automates energy monitoring, billing, and user notifications. It integrates cloud communication, GSM, and Wi-Fi to provide real-time energy consumption data, prevent power misuse, and optimize power distribution. The system aims to address challenges in manual billing, power theft, and energy wastage while empowering consumers and utility providers with remote monitoring and control capabilities.

Scope:

The project introduces a **Smart Energy Meter** system to enhance energy monitoring and optimize resource usage. It leverages IoT, GSM, and cloud technologies to enable real-time data sharing, efficient energy distribution, and dynamic pricing. This system targets both consumers and energy suppliers, addressing inefficiencies in traditional metering while improving power management and reducing wastage.

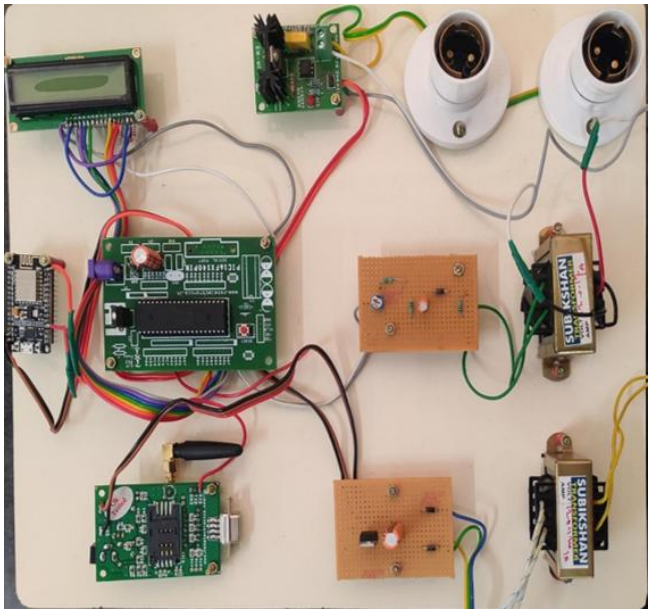
Objectives:

- Automate energy meter reading, eliminating manual intervention.
- Enable real-time monitoring of energy consumption.
- Optimize power usage and reduce blackouts by balancing electric loads.
- Facilitate dynamic pricing based on demand.
- Empower suppliers with behavioral insights for efficient energy distribution.
- Enhance consumer awareness of energy usage patterns.

Design and Components:

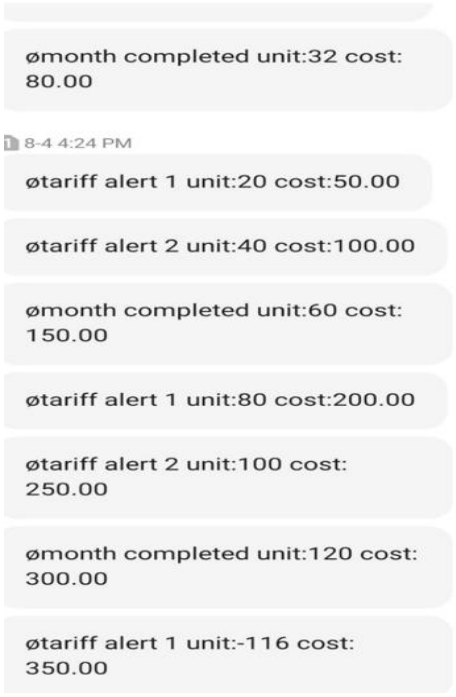
S.NO	Components	Rating/Type	Quantity
1	PIC Microcontroller	PIC16F874A/877A	1
2	LCD Display	5V/16 x 2-bit	1
3	GSM Module	12V	1
4	Node MCU	5V/ESP8266	1
5	Transformer	12-0-12V/1A	2
6	Thyristor	-	1
7	ThingSpeak	Cloud	1

Experimental Setup:



Output Generated:

Text message output



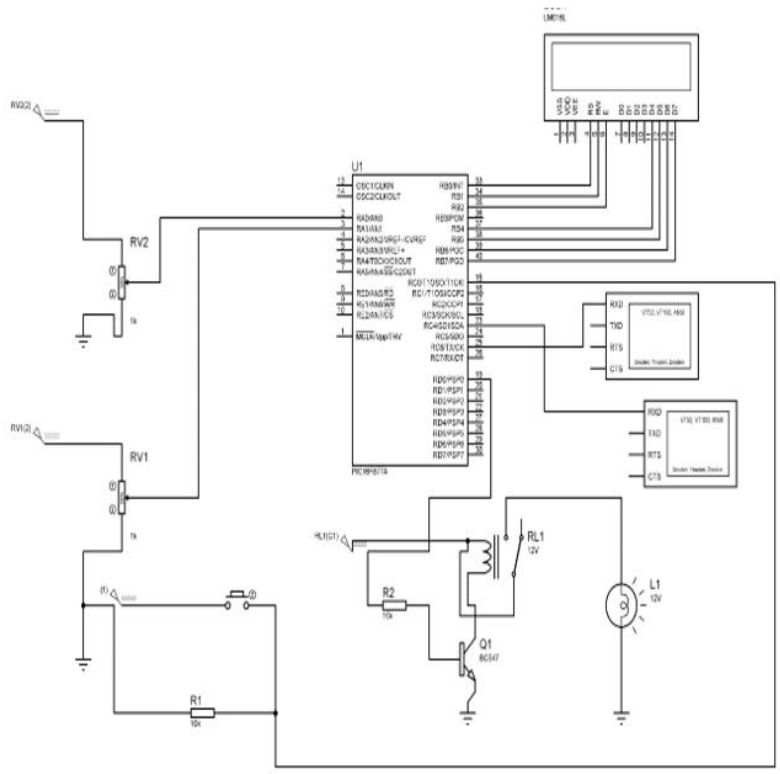
In this the amount of unit used is mentioned and also the value of the cost is also given so it will be the bill and it is easily notified to the end consumer or user

OUTPUT OBTAINED FROM CLOUD:

The current power status is compared with the threshold value that is assigned by the IoT medium, if the value exceed from the threshold value the relay unit will trips the power unit. The entire parameters will be monitored with the LCD display along with the IoT ThingSpeak web page.

In the above images taken as output from the cloud gives the 30 days and 60 days of data it is available to the consumer as well as the provider and easy to monitor with no or less human intervention.

Circuit diagram:



Advantages:

- Positive feedback
- Less time consuming
- Automation is achieved.
- A convenient and efficient method to avoid the problem of electricity department sending employees for taking meter reading every month.
- No human errors in taking the meter readings.
- Free from outsider interference, entering the private places.
- Economical and simple to use.

Conclusion:

The IoT-based Smart Energy Meter system replaces traditional energy meters with a modern, automated solution. It enables accurate power readings, optimizes energy usage, and reduces wastage. Data is uploaded to Thinkspeak.com, allowing both providers and consumers to access real-time energy usage. This system ensures transparency, prevents malpractices, and simplifies billing and monitoring. With its ability to provide on-demand updates and accurate accounting, it significantly improves energy management and operational efficiency.