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INTELLIGENT UTILITY METER

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Abstract - *To sustain our life electricity is incredibly important. Nowadays most people suffer from energy bill rises. This paper analyzes residential appliances excess energy usage, based on the electrical appliances ' average current value. In the generated WebPages, the day-to-day power usage data is modified and accessed by user and EB officials. The ultimate aim of this paper is to develop and incorporate the stand-alone system to identify excess energy usage and eliminate inefficient system fault. A standalone system with Node MCU leads with IoT concept was developed using sensor connectivity. The device's benefit is economical, and to prevent depletion of electricity.*

Key Words: *IoT, Node MCU*

1. INTRODUCTION

Energy is one of the most important building blocks in human development and serves as a central factor in deciding all countries ' economic growth. Consumption of residential electricity (REC) is the cumulative energy used by households to power appliances such as ceiling fans, televisions and refrigerators. Since 1971, it has increased many times and now constitutes around a fourth of India's overall electricity consumption.

This can continue to rise in the future due to household income rises and technology growth. India aims to provide all households with uninterrupted (24x 7) electricity by 2019, a quarter of which currently have no electricity link and the remainder facing regular power cuts. The total consumption of electricity increased from 553995 GWh in 2008-09 to 11, 30, 244 GWh in 2017-18, showing a 7.39% CAGR. The percentage rise in electricity use between 2016-17 (10, 61,183GWh) and 2017-18 (11, 30,244 GWh) is 6.51 per cent. Of all out power consumption in 2017-18, industrial area represented the largest offer (41.48%), trailed by residential (24.20%) followed by domestic (24.20%). Because of the increase in demand due to technological advancements, population, modernization & economic growth, energy consumption is continuously growing. Every financial year, the power consumption rate increases by 7 per cent.

This paper addresses the consumer problem, and focuses on natural resource conservation.

Jalpa Patel[1] Suggested that device helps us save nearly 25 per cent of the monthly electricity current sensor is used to track household appliances and upgrade to the cloud. To measure the expense, we should enter the start and end date, it will display the devoured power expenditure.

Surya predeep[2] found that all electronic home appliances can be done with Internet of Things (IoT) assistance. The deliberate use of the vitality of individual machines can be seen by a portable application and the data can be retrieved from the server and further organized so that the customer should be alerted when his duty plan is about to be transformed via an alert message if his schedule of duty is about to change due to overuse of vitality.

Vishal K Upadhye[3] found that the Smart Energy management algorithm was designed to move the OFF unit if it exceeded the highest energy consumption threshold level.

It will save massive amounts of power when some unwanted computer is running, Amal B Krishna[4] investigated traditional process, a person reads the number of electrical units consumed and transfers the information to the distribution unit and prepares the bill according to the units.

Jyothi kiran [5] suggested power, connecting and disconnecting devices on real-time rates. Managing energy efficiency helps to promote the use of electrical devices.

2. OVERVIEW

The numerous literature studies that were done helped develop the technique of replacement to regulate and record power consumption. The system proposed has two parts: the first part is a hardware component consisting of a sensor to control the household appliances ' power consumption. The second part is software component which leads to server communication and also provides updated data about individual utilities power consumption.

3. PROPOSED ARCHITECTURE

The device's attached to the home's phase cable. It determines and compares the power consumption of connected load with the average power consumption and tells whether the power consumption of the connected load exceeds the average value. It also tells defective system status whether it needs to be serviced or replaced. In the present wiring network it does not need any infrastructural adjustment. The schematic diagram of an proposed work is given below:

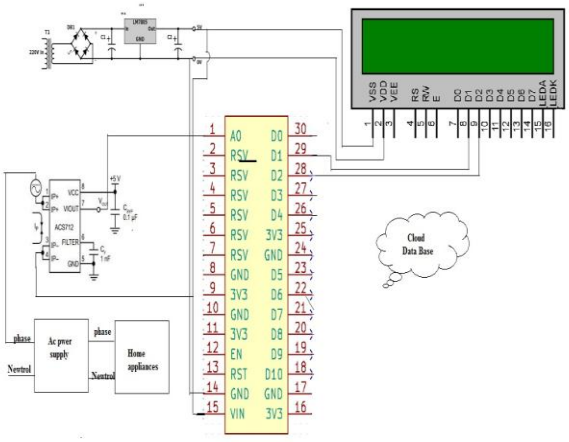


Fig -1: Schematic Diagram

4. METHODOLOGY

Our methodology leads users to consider the use of vitality modestly and through this strategy users can eventually see their concept of use and follow their actions to reduce their energy use and expenditure. The current threshold value of household appliances are indicated.

Table -1: Load Calculation Of Individual Appliances

s. no	Electrical load	Rated power consumption value (watts) / day	Threshold current value (amps)	Obtained current value (amps)	Status of difference
1	Laptop	50-100	0.2017-0.434	1.64	1.206 (excess)
2	Iron box	800-1200	4.347-17.391	5.22	0.873 (Normal)
3	Fridge	100-200	0.434-0.869	1.46	0.591 (excess)
4	Heater	4000	17.391	15.32	2.071 (normal)
5	Fan	60-75	0.260-0.326	0.56	0.234 (excess)
6	Washing machine	500	2.173	3.422	1.249 (excess)
7	Phone charger	3-7	0.0130-0.0304	0.39	0.36 (excess)
8	Electric stove	2000	8.695	5.67	3.022 (normal)
9	Micro-wave oven	600-1700	2.608-7.391	5.33	2.72 (normal)
10	Toaster	800-1500	3.478-6.526	6.22	2.742 (normal)

The current sensor used to measure the fluctuation of power which is supplied to the microcontroller. The controller controls all of the system's features. It may be any form of microcontroller; a NodeMCU microcontroller has been used for this paper for easy implementation and inexpensive system-on-chip (SOC). The design offers an opportunity for each appliance and if the power the devoured is not within it tells the consumer about the equivalent as far as possible. The results are stored in the cloud server and can be accessed by officials of users and EB.

5. RESULTS AND DISCUSSION

HARDWARE DEVELOPED

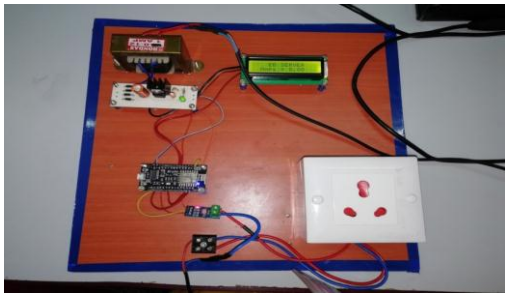
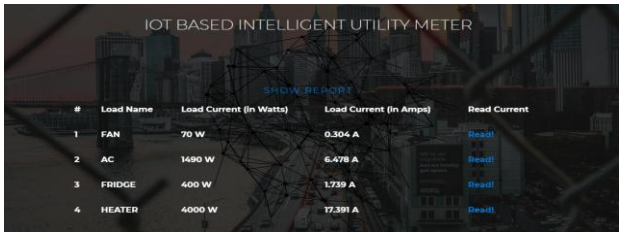


Fig -2: Developed Experimental Setup

The current consumption of an home appliances were also seen through the particular created webpage.



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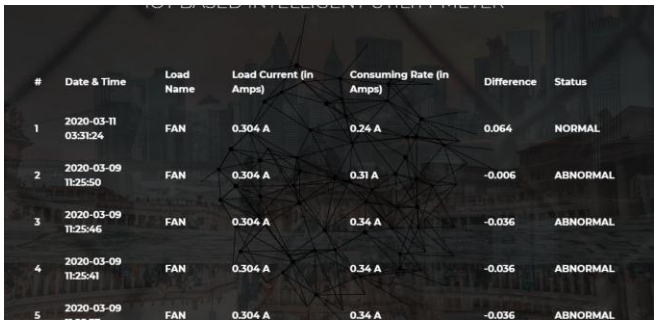

6. CONCLUSIONS

In this project, we have collected the database for the current consumption of domestic appliances for fixing the threshold level at cloud end for comparison. In addition, we have implemented the system which can able to monitor the current consumption of various domestic electrical appliances at a maximum level up to 30 amp and display the result in LCD device. .In future, it is planned to upload the observed readings of targeted testing appliances in to cloud server for comparing it with threshold level fixed in cloud server in order to identify the defect of the appliance under test and to suggest appropriate remedy action.

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BIOGRAPHIES

A.Priyadarshini completed her B.E Electronics and Communication Engineering from National Engineering College, Kovilpatti, India and currently she is pursuing her Masters degree in Embedded systems technology from National Engineering College, Kovilpatti. Her area of interest is Wireless Sensor Networks.

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