ENERGY MONITORING SYSTEM USING IoT TECHNOLOGY

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Abstract: There are many problems in metering and billing processes for meter reader to take meter reading manually due to the non-existence of the customers at their homes during that time, problems while taking meter reading and sometimes the areas are not safety. The conventional method is not much suitable to retrieve the energy meter data and billing. It is tedious process for the meter reader to collect it manually and submit to the electrical distribution office to issue the bill for each consumer. On the other hand, energy meter in-service suffers from well-known measuring errors. The above problems impacts two significant things, Waste of Money and lack of Electricity Distribution Management which results in lack in electric power.

Energy Monitoring System will takes automatically the reading of respective electrical parameters i.e., voltage ,current ,power and energy units consumed using Arduino Microcontroller .With this values we can know the consumption of power. This project provides a vital solution for Energy Monitoring System using Internet of Things(IoT) technology that enables us to develop the system without human interference and with the use of smart energy meter to read electrical energy consumed to get an accurate reading.

Index Terms - **Energy , Arduino, Distribution, Sensor , Internet of Things(IoT)**

I. INTRODUCTION

With the increase in population in India the demand for electricity is increased. Energy meters are mainly used for how much energy consumed by the consumer. Every month meter reader has to go and take the reading. There are many problems in metering and billing processes for meter reader to take meter reading manually due to the non-existence of the customers at their homes during that time, problems while taking meter reading and sometimes the areas are not safety. The conventional method is not much suitable to retrieve the energy meter data and billing. It is tedious process for the meter reader to collect it manually and submit to the electrical distribution office to issue the bill for each consumer. On the other hand, energy meter in-service suffers from well-known measuring errors. Monitoring is very important as it is mainly focus on the existing pattern of energy consumption. Energy monitoring system is a technique that uses energy information as a basis to eliminate waste, reduce and control current level of energy use and to reduce the human interference. Bureau of Energy Efficiency (BEE) quoted that *"you can't manage what you don't measure"*. It combines the principles of energy usage and monitoring. Internet of Things(IoT) is an environment that has the capability to transfer the data and develops the system without human interference.

II.ENERGY METERING AND BILLING SYSTEM USING CONVENTIONAL METHOD

Electricity meters (or) Energy meters are widely used for the measurement of energy in Domestic and industrial A.C. circuits. These are installed at consumers' premises for billing purposes. These are calibrated in billing units, the most common one being the kilowatt hour (kWh). The electro mechanical induction type energy meter measures the instantaneous voltage and currents, calculates its product and gives instantaneous power. This power is integrated over a period which gives the energy consumed during that time period.

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fig. 1: Analog Energy Meter

III. ENERGY METERING AND BILLING SYSTEM USING PROPOSED METHOD

There are two methods for measuring electrical energy, analog and digital method. This Project proposes the smart meter, then the digital method only will be introduced. Measurement of energy quantities and data transmission, and all the necessary operational considerations was presented. IoT is the method of communication channel between the energy meter and web server.

With the proposed system, live monitoring of energy consumption will be made possible. Transparency is maintained between the service provider and the consumer since the billing process is totally transparent and can be monitored anytime, anywhere. It will create awareness to the consumers to save energy. It can also helps to the Distribution board to maintain the proper demand and supply of electricity.
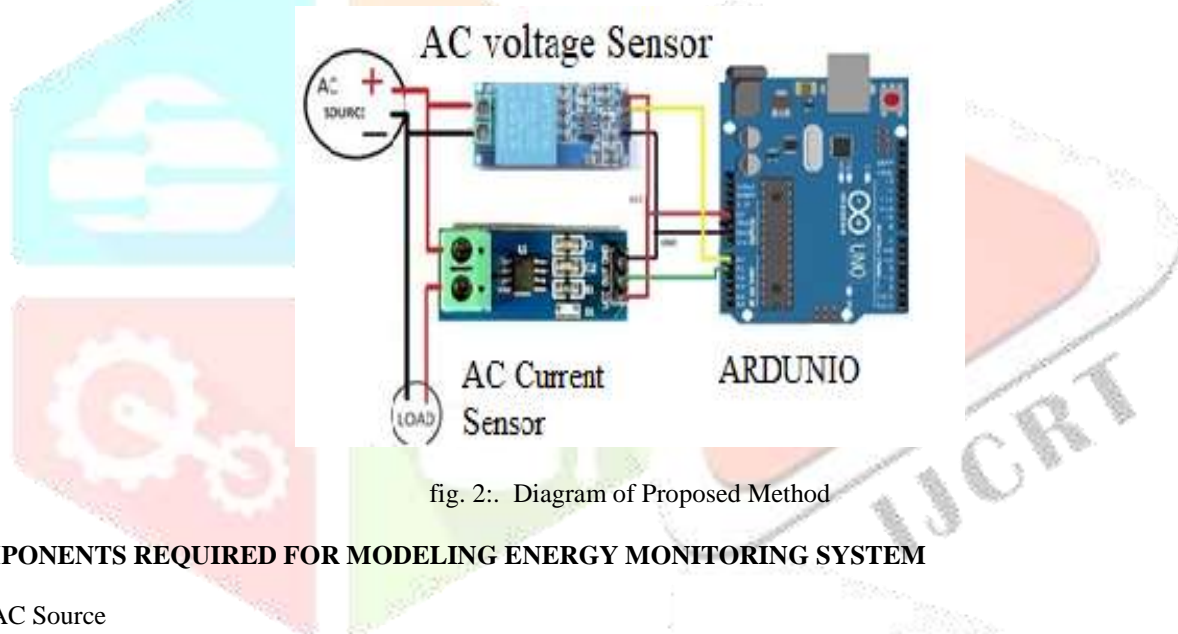
fig. 2:. Diagram of Proposed Method

IV. COMPONENTS REQUIRED FOR MODELING ENERGY MONITORING SYSTEM

1. AC Source
2. Ardunio Mega
3. AC voltage Sensor
4. AC Current Sensor
5. Loads (Lamps)
6. HDMI cable
7. USB cable
8. Computer

V. CONNECTION DIAGRAM

The voltage and current sensors collects data from load and is sent to Arduino Controller through USB cable. In the Ardunio code the formulas for power, energy are written and it displays the voltage , current, power , energy and number of units consumed on the Computer Monitor Screen. In this project the loads are considered as lamps, with one lamp load, two lamp loads and with all lamp loads observed and the corresponding Voltage, Current, Power , Energy and no of Units Consumed is displayed on the Computer Monitor Screen.
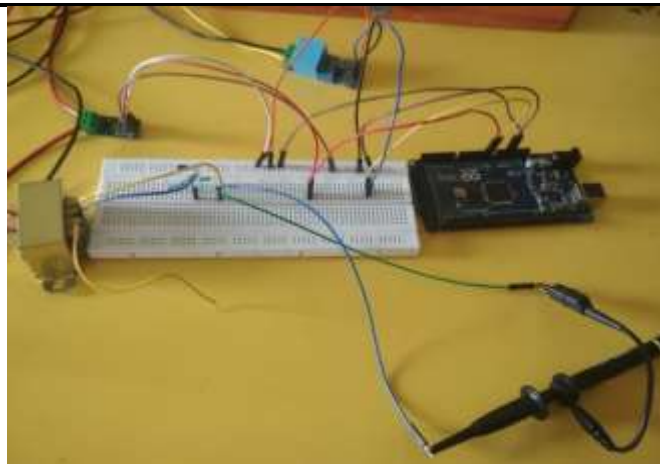
fig. 3: Connection diagram for Ardunio

fig. 4: Connection diagram from Ardunio to Load (Lamps)

VI. OUTPUTS
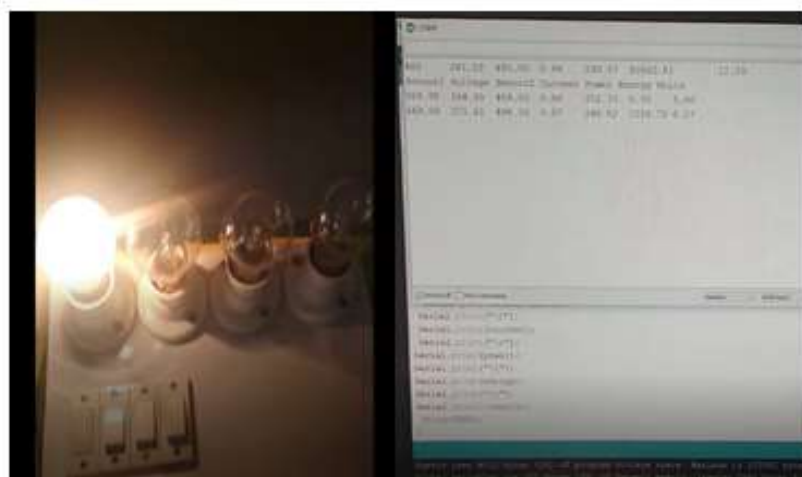
fig. 5: With One lamp Load , Voltage, Current, Power , Energy and no of Units Consumed

fig. 6: With three lamps Load ,Voltage, Current, Power , Energy and no of Units Consumed

VII. CONCLUSION

With the proposed system, live monitoring of energy consumption were made possible. It collects the reading of respective electrical parameters i.e., voltage ,current , power and energy units consumed automatically using Arduino Microcontroller. Here we done code with one lamp load and with all lamp loads that is used in our project and the corresponding Voltage, Current, Power , Energy and no of Units Consumed is displayed on the Computer Monitor. Transparency is maintained between the service provider and the consumer since the billing process is totally transparent and can be monitored anytime, anywhere. Energy is the basic thing for the economic growth of any nation. By using energy-consumption information consumers will gain more visibility of their energy accounts, helping them to save more in the future and automatically it goes to Distribution Board. It will create awareness to the consumers to save energy. It can also helps to the Distribution board to maintain the proper demand and supply of electricity.

VIII. REFERENCES

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