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User Friendly Smart Energy System Using IOT

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Abstract:- The energy meter will incorporate with embedded controller and ESP8266 Wi-Fi Module to transmit the information like consumed units, generated bill and offers alert message. therefore reduces the employment of man power. This knowledge are often then fed and integrated into existing energy management systems settled at the domestic shoppers to find any abnormal conditions.

Keywords:- *ESP8266 Wi-Fi Module, Arduino Uno, Mobile Application, Current Transformer, Voltage Transformer, Sensors.*

I. INTRODUCTION

Energy meter charge is a crucial a part of energy distribution. Every time someone is required from the authority to gather the reading of meter and make a bill to the buyer. However this created a haul as a result of the manual reading wants personnel, time intense and would cause a slip. So, sensible energy meter comes for providing the facilities of automatic reading of meter and can also find the meter tempering by causing the message with the assistance of IOT. It can also find the fault if happens within the electrical system overloading and warn the buyer of overload usage of electricity by causing the message. Stealing of electricity is a difficulty, these days in energy meters, there's no proof of tempering of meters therefore it's not reliable because the IoT based energy meter have the various options and saves the electricity from theft that is prohibited and additionally defend from overloading of electricity to client. Automatic affiliation and disconnection are often done by passing a code like a word from the board supported bill payment of client through IOT.

The consumer should be expedited by giving them a perfect resolution that's the thought of IoT (Internet of Things) based mostly ENERGY METER. Here the facility reading is uploaded to cloud victimization ESP 8266. it's associate UART (Universal Asynchronous Receiver/Transmitter) to Wi-Fi module that permits microcontrollers to attach to a Wi-Fi and create easy TCP/IP connections victimization AT commands. ESP 8266 is a powerful, low price Wi-Fi module appropriate for adding Wi-Fi practicality to associate existing microcontroller. it's one among the leading platforms for IoT (Internet of Things). As there's no human involvement within the entire method, there's no probability of manual errors. These place a lot of management into the hands of consumers by giving them a lot of careful info concerning power consumption.

II. LITERATURE SURVEY

1. "**Smart Energy Meter Using Android Application and GSM Network**" - This is implemented to get a fully automated electricity bill consumed by consumers in a locality and transmitting to the power station for calculating and issuing bill.
2. "**Smart Energy Meter**"- The newest energy meter is not tamper authentication and an energy meter that is tamper proof, supports automatic metering and billing system and also helps in finding fault location in transmission lines should be designed
3. "**IoT Based Energy Meter Reading**" - Automatic Bill generation using telemetric communication. This helps in reducing energy consumption as the owner is continuously notified by the number of units that are consumed.
4. "**Smart Energy Meter Surveillance Using IoT**" - Energy consumed is given by the meter on daily basis, its corresponding rupees, billing details and payment using IoT. Additionally, it has the main objective of giving the preintimation of power schedule and an alert system for producing an alert when the energy consumption exceeds beyond the threshold.
5."**IOT Smart Energy Meter using pic microcontroller**" -IOT based smart energy meter is a type of energy meter that not only shift the consumer supply form one grid station to another grid station automatically, also calculate the cost of their consumed energy

Based on these works we enhanced the services like alerts to the consumer and other electrical parameters will be shown at real time to the consumer anywhere in the world via integrated mobile application (IoT). This whole work is done by Blynk software app through internet browsing.

III. CONSTRUCTION

The proposed system consists of an Arduino Uno to control the entire system. The model also consists of a current sensor, voltage sensor and frequency detector to sense the signals of current, voltage and frequency of the ac input distributed from the distribution transformer which is of 23KV/415V, 230V. The Arduino is supplied with the 12 V dc. It also consists of the LCD display to monitor the electrical parameters connected to the controller. The ESP8266 module integrated with the mobile application is also connected to check the real time condition of the units consumed using IoT [4].

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IV. BLOCK DIAGRAM

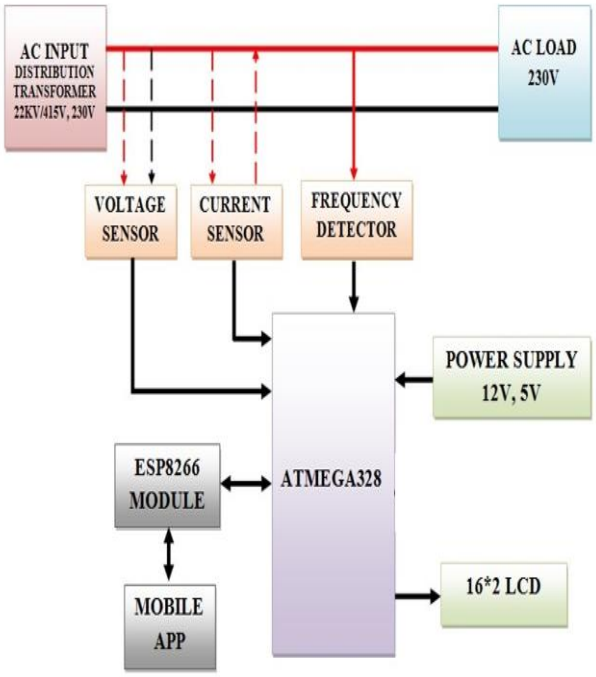

Fig 1: Block Diagram Representation

The above block diagram represents our proposed 'User Friendly Energy Monitoring system using IoT'.

V. WORKING PRINICIPLE

AC input from the supply is given as input and using voltage sensor, current sensor and frequency detector analog inputs are given to the controller. The controller is powered up using a power source of 12V and fed with normal rated operating conditions of the transformer. Change in input parameters are continuously monitored by the controller and updated to the user. The real time operating conditions are sent to the consumer using IoT. The real time values of the ac input can be checked through mobile application anywhere in the world.

Whenever the units consumed reaches 100/200/300…etc,. units an alert message will be given to the consumer with ±5units (ie. At 95unit and 105 unit alert message will be delivered). We can also connect relays when this system detects any abnormal change in the load side as well as input side and cut off the load from the supply. A buzzer when connected to the controller also alerts the people at home, when there is any faults in the line. The LCD also displays the voltage, current and frequency of the ac input line[3].

VI. HARDWARE SETUP

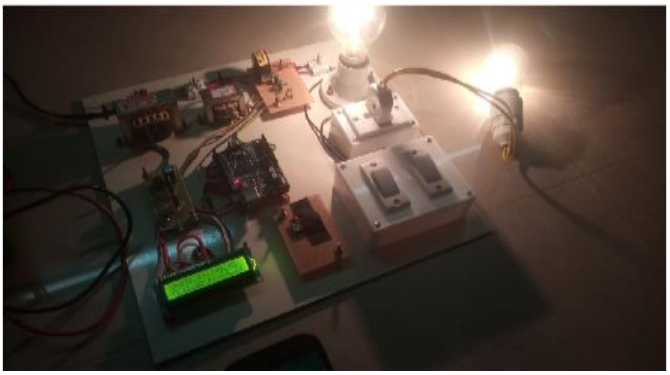

Fig 2: Hardware Illustration

VII. COMPONENTS DESCRIPTION

Arduino Uno:

Arduino Uno is associate open provide microcontroller. The ATmega328P provides UART TTL serial communication and is equipped set of digital and analog I/O pins that is interfaced with various components. The board has fourteen digital I/O pins, six analog I/O pins and it's programmed with Arduino IDE. It's powered with USB cable

LCD display:

Liquid Crystal show is Associate in Nursing device that operates by applying varied electrical voltages to a layer of liquid. It's sixteen pins that consists of knowledge lines, power, ground, controls the operation of liquid show, adjusts liquid visual display unit brightness and powers the backlight.

Voltage sensor:

Voltage detector allow-cost detector for measure voltage. It supports the principle of resistive resistance. The pin Vcc is connected to the positive terminal of the external voltage provide (0-25V). Gnd pin is connected to the Negative terminal of the external voltage provide. it'll provide a resolution upto 0.00489V.

Current sensor:

A current detector can be a tool that detects signal in proportional to current. Typically analog voltage or current or a digital output is measured by the generated signal square.

ESP2866:

The ESP8266 Wi-Fi Module has integrated TCP/IP protocol stack which has microcontroller access to the Wi-Fi network and It is primarily used for development of networking of Things (IoT) embedded applications and also it is powerful on-boarding processor and storage capability that allows to integrate with the sensors.

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Frequency detector:

A Frequency detector could be a mixer-like circuit that has signal that's proportional to the input signals of a similar frequency. The freq detector provides a series of output pulses whose breadth is proportional to the frequency.

Transformer:

A distribution transformer may be a feeder voltage to domestic side voltage. These transformers are available near generating substation. Distribution transformers generally have ratings less than 200 kVA. It consists of signals of the same frequency. The phase difference is proportional to the phase detector provides a series of output pulses width.

VIII. CIRCUIT DIAGRAM

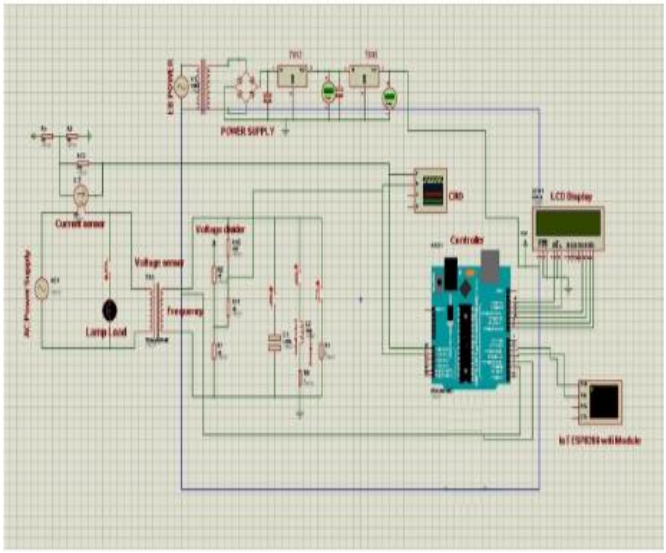

Fig 3: Circuit diagram

IX. CONCLUSION

An attempt has been created to form a practical model of 'User Friendly smart energy system using IOT.'The propagated model is employed to calculate the energy consumption of the household, and even build the energy unit reading to be simple and correct. Thus it reduces the wastage of energy and brings awareness among all. Even it will deduct the manual intervention. The development in technology regarding electrical distribution system may be a non-stop method. During this project work, wireless meter reading system is calculated to endlessly monitor the meter reading and value.

X. RESULTS

This system detects the abnormal conditions and displays the kind of fault, frequency, voltage, current, power factor in the mobile application as well as the LCD screen. It jointly alerts the user by means of a buzzer sound. If the voltage reaches above the threshold value i.e., 230V it sends the fault as over voltage condition. Therefore the user will read the real time values at any instant.

Fig 4: Output of the proposed system in App

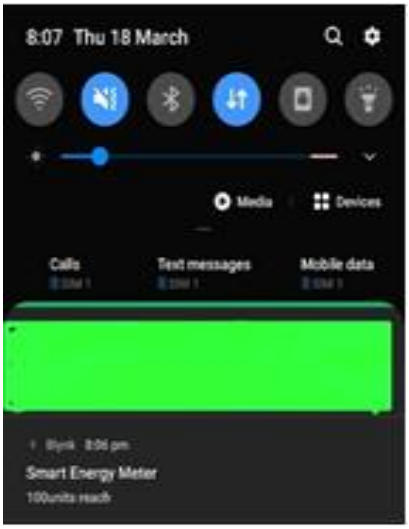

Fig 5: Notification obtained on the mobile

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