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IOT BASED SMART ENERGY METER WITH INSTANT BILLING

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Abstract: The energy consumption is monitored by using an electric device called energy meter. The price and therefore the regular usage of Power consumption are informed to the user to overcome high bill usage. The Energy meter shows the quantity of units consumed and transfers the information to both the customer and to the electrical board so this helps in reducing man-power. The user can check their Power usage from anywhere and at any amount. The IoT is employed to show on/off the household appliances using relay and Arduino interfacing. The target of this method is to observe the number of electricity consumed. The distribution and consumer both are benefitted by eventually reducing the full Power consumption.

IndexTerms **– ESP8266, Atmega328, Relay module, LCD Display.**

I. INTRODUCTION

The systems consist of a microcontroller ATMEGA328P, Node MCU, LCD display, Relay module, and Current sensor. In the system Microcontroller continuously reads the energy meter using the Wi-Fi module. It is used to transmit the information to the receiver. Irregularities in bills and reduced manpower are overcome by IoT systems in high buildings and luxury housing plots. There is a cost of chance for missing bills, and non-appearance of the buyer and to avoid this problem meter replacement is needed with more efficiency and accuracy is also needed to avoid further occurs in future. In this IOT system, the e-meter will sense the energy consumed and automatically generate bills. Methods are used to represent the bill for consumer knowledge and this method is more beneficial for the current scenario. The increase in power or energy consumption automatically increases the cost to avoid these types of problems this paper will be helpful to protect our house more save and save more energy and cost. Thinkspeak is a cloud server to communicate between the consumer and Electricity board. Voltage and current values are sensed by the sensor and stored in the server. This device enables consumers to easily monitor and track their energy usage.
Nowadays, people are checking their energy usage by manually reading their electricity meters, which is inefficient and provides very little information. There is a growing concern over the amount of energy consumed and the awareness of the community. By using this device, consumers will be able to use the internet or smartphone application to monitor and economize their energy consumption. With more information people have about their energy usage, they will be able to reduce their energy consumption and therefore save both energy and money.

II. LITERATURE SURVEY

Internet of things (IoT) relies and highly desirable within the field of energy, during this framework, customers can control administration by Knowing vitality utilization from time to time, and also the buyer has to pay the bill on the plan. On the off chance that couldn't the electrical power, availability are often killed self-ruling from the far-off host. [1] explained the modeling and dealing of various units of the system and also discussed the components and their functions specified IOT and its working microcontroller and its architecture. Reducing energy consumption and monitoring the units consumed. To form the electrical apparatuses insightful and provides solace to devoured and lessen control utilization in web applications. [2] Suggested it in light of ARDUINO UNO controller and IoT innovation. On the off chance that any altering happens, the controller will send information to the server and additionally, it chopped down the vitality supply naturally. At the purpose when the foremost extreme request of vitality expenses are shown within the meter utilized by the customer. [3] Clarified within the wake of surpassing the foremost significant request, the meter and subsequently the association are going to be consequently disengaged by an installed framework embedded within the metering sensor. The LDR (Light Dependent Resistor) sensor is placed on an energy meter which The LDR (Light Dependent Resistor) sensor is placed on an energy meter that senses LED blinking pulse. At that point microcontroller sent this reading via the GSM module and its send this message to the electricity board. During this framework, a keen vitality meter is introduced in each customer unit a server is well-kept at the specialist co-op side. [4] Implemented both the meter and a server equipped a GSM module which inspires bidirectional correspondence between the 2 closures utilizing the present GSM foundation. the consumer can energize their vitality meter without much of a stretch by sending a stick number covered up in an exceedingly scratch card to the server utilizing SMS. So as to avoid of these drawbacks, we've intended to construct an IOT-based energy meter in order that the proposed energy meter measures the quantity of power consumed and uploads it to the cloud from which the

concerned person can view the reading. The ability reading sends to the cloud using ESP8266, a Wi-Fi module. [5] Explained the ability reading from the digital wattmeter is read using the coupler and transmitted digitally to the Arduino. So it automates the method of measuring the facility consumption at homes using IoT.

III. BLOCK DIAGRAM

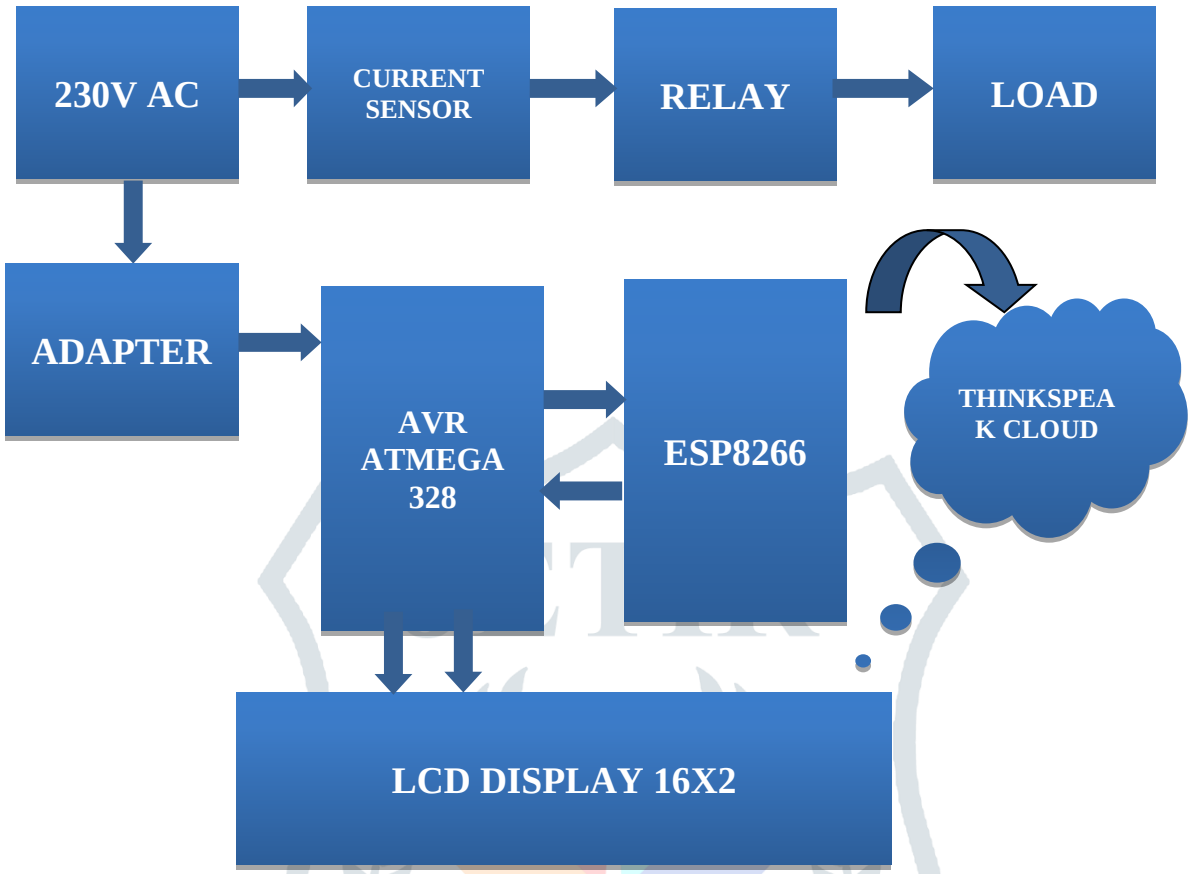

Fig.1: Block Diagram

A bridge rectifier is electronic circuit made of PN junction diode. The main function of bridge is converting AC (Alternating Current) to Pulsating DC (Direct Current) voltage. A bridge rectifier is used to convert AC into pulsating DC voltage. The output of capacitor cannot provide pure DC supply. Filter is connected across the Bridge rectifier. The capacitor main function is charge the store and release when it required. A Voltage regulator is used for regulate the output voltage; input voltage is vary but fixed output voltage. LCD Display 16x2, Liquid Crystal Display it shown 16 characters per line. LCD display is used is easy to use and cheaper in rate. Current sensor is measure the AC current of the load. Relay is electromechanical switch is used in Electrical circuit like lamp, motor. Relay coil is active when microcontroller sends the signal to the relay. We have used microcontroller is Atmega 328. The main function of controller is control the relay, display the character and send data to the thinkspeak cloud.

Atmega 328

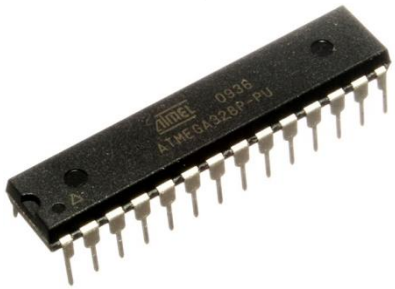

Fig.2: Atmega 328

Arduino Uno can be a microcontroller board supported the ATmega328P. Its 14 digital input/output pins (of which 6 is employed as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, an influence jack, an ICSP header and a button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to induce started.. You'll be able to tinker along with your Uno without fear an excessive amount of about doing something wrong. "Uno" means one in Italian and was chosen to mark the discharge of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is that the primary during a series of USB Arduino boards, and thus the reference model for the Arduino platform, for an intensive list of current, past or outdated boards see the Arduino index of boards.

Relay Module

Fig.3: Relay Module

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by signal.

ESP8266

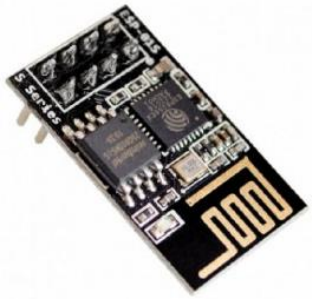

Fig.4: ESP8266

The Node MCU WI-FI Wireless Transceiver Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

IV. RESULTS AND DISCUSSION

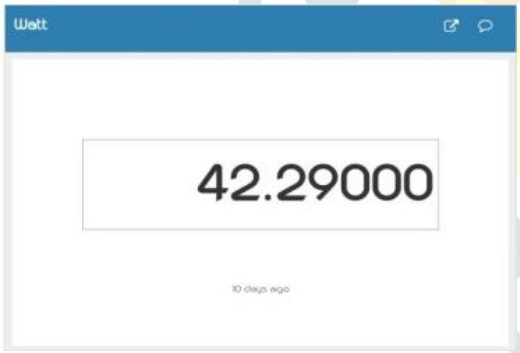

Fig.5: Watt

Fig.6: Unit

The meter calculates the power consumption with a help of a pulse count technique and reading showed in a display, the proposed system uses a controller and it takes the input from the pulse count unit as an analog input and it process the data and displays the output in LCD Display and also it is transmitted to the web server through the internet. It uses a WIFI module to communicate between the meter and the web server. It displays the parameter such as watt, total unit on web server.

The watt calculation formula,

Watts = Amps x Volts
= 5 Amps x 240 Volts
= 1200 Watts.

So, if a 100-watt bulb is left on for 10 hours, it will use the following amount of energy: 100 x 10 = 1000 Watt-Hour = 1 Kilowatt-Hour (kWH) = 1 unit (on your meter).

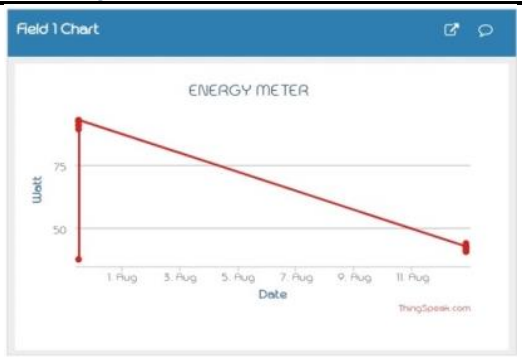

Fig.7: Energy Meter-1

Fig.8: Energy Meter-2

Fig.9: Lamp Indicator

Fig.10: Watt Gauge

Fig.11: Billing Unit

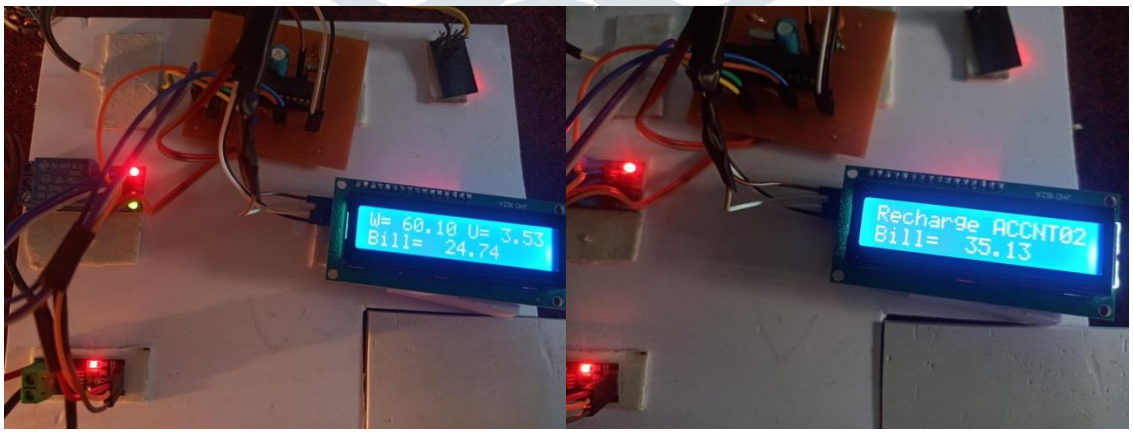

Fig.12: Actual Model photos

In the proposed technique the Customer can deal with their energy utilization by knowing their energy use time to time. If the customer neglects to pay the power charge the energy supply would be cut off energy and once the Bill is paid the energy supply is reconnected. In addition with the existing system innovative to include an alert lamp indicator as shown in figure 9. To the user energy consumed for 30 days once, constant alert with payments details and power usage until the payment is done. To avoid the further consumption of energy, we are setting a limit for each household and if the limit exceeds methods are used to cut down the appliances.

Applications

- It is used in residential and commercial building in a public energy supply system
- It is used in Municipal Corporation
- It is used in Public Power Sources
- It is used in MSEB
- It is used in Govt. Energy plant

CONCLUSION

The aim was to design and develop a device that monitors the energy consumed and then sends the data by a wireless transmission system. The data is collected by a data management system which can provide the energy usage information to the user in through the internet. This device enables consumers to easily monitor and track their energy usage. Nowadays, people are checking their energy usage by manually reading their electricity meters, which is inefficient and provides little or no information. There's a growing concern over the number of energy consumed and also the awareness of the community. By using this device, consumers are able to use the net or the smart phone application to observe and save money their energy consumption. With more information people have about their energy usage, they'll be able to reduce their energy consumption and thus save both energy and money.

Advantages

- To reduce wastage of energy.
- Make every customer a self-interested guardian of the power (energy) supply.
- Real time bill monitoring
- Time reduced receiving bill.

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