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"SMART AUTO ENERGY BILLING SYSTEM USING IOT"

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Abstract **-** The main motive for this project is to create an automatic system to generate electricity bills. The complete system will keep on monitoring the electric bill and the microcontroller unit will be used to keep a record of all the units.As the month will be completed the total units consumed will be calculated and accordingly, the bill is autogenerated and displayed on the VIRTUAL LCD also a notification can be sent to the electricity board as well as the consumer describing the amount of the bill. At the end of the month, a predefined message sends by the electricity department to nod the e mustached wan ith energy meter. Then node MCU connected with the meter replied to a message which contains the total number of r units consumed the and calculated amount to the electricity department. We can see a person standing in front of our house for further electricity board, whose duty is to read the energy meter and rover over the bills to the owner of that house every month. This is nothing but a meter reading. According to that read I, ng we have to pay the bills. The main drawback of this system is that person has to go area by area and he has to read the meter of every house and cover the bills. Many times errors like extra bill amount or notification from the electric board even though the bills are paid are common errors. To overcome this drawback we have come up with an idea that will eliminate the third party between the consumer and service provider, and uneven errors will be overcome.

Keywords- IOT, ENERGY METER, Node MCU

1. INTRODUCTION

In the current billing system, distribution companies cannot keep track of the changing maximum demand of consumers. The consumer is facing problems like receiving due bills for bills that have already been paid as well as poor reliability of electricity supply and quality even if bills are paid regularly. The remedy for all these problems is to keep track of the consumer's load on a timely basis, which will help to assure accurate billing, track maximum demand, and detect threshold values these are all the features to be taken into account for designing an efficient energy billing system. The present project "SMART AUTO ENERGY

BILLING SYSTEM USING IOT" addresses the problems faced by both the consumers and the distribution companies. The paper mainly deals with a smart energy meter, which utilizes the features of embedded systems i.e. combination of hardware and software to implement the desired functionality. The paper discusses a comparison of Arduino and other controllers, and the application of GSM and Wi-Fi modems to introduce the 'Smythe art' concept. With the use of a GSM modem, as well as a service provider, the provider will get the used energy reading with the respective amount, Consumers will even n get a notification in the form of text through GSM when they are about to reach their threshold value, that they have set. Also with the help of f Wi-Fi modem, the consumer can monitor his consumed reading and can set the threshold value through the webpage. This system enables the electricity department to read the meter readings monthly without a person visiting each house. This can be achieved by using an Arduino unit that continuously monitors

and records the energy meter reading in its permanent (non-volatile) memory location. This system continuously records the reading and the live meter reading can be displayed on the webpage to the consumer on request. This system can also be used to disconnect the house's power supply when needed.

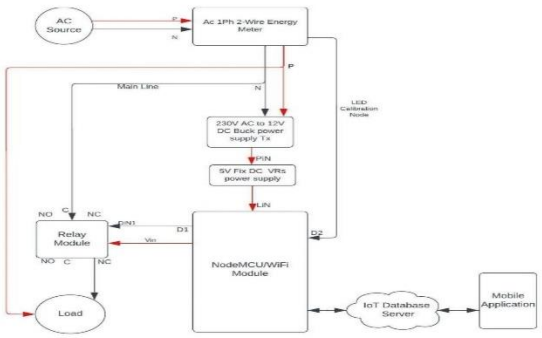
2. LITERATURE SURVEY

IoT-based energy meter is easy to install and beneficial for both energy providers and customers. Whenever a fault occurs it indicates to the customer. Customers can inform the company then the energy provider company can cut the power easily by sending the NOTIFICATIONS to that particular ID number that is connected to the NODE MCU. The statistical load used and profile help the customer to manage their energy consumption. This helps them to reduce their outstanding dues. In the current billing system, distribution companies cannot keep track of the changing maximum demand of consumers. The consumer is facing problems like receiving due bills that are already been paid as well as poor reliability of electricity supply and quality even if bills are paid regularly. The remedy for all these problems is to keep track of consumer load on a timely basis, which will head to assure accurate billing, track maximum demand, and detect threshold value these all are the features to be taken into account for the design of an effective energy billing system.

3. OBJECTIVES

1. distance switching i.e on and off the power supply from anywhere via mobile IoT.
2. live monitoring.
3. automatic billing.
4. Two user logins (User and Administrator)

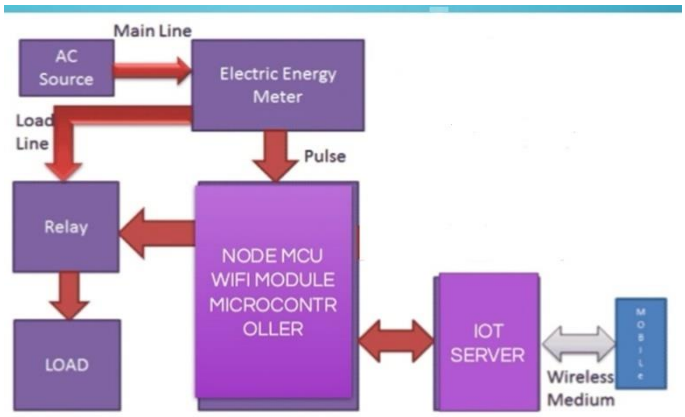
4. CIRCUIT DIAGRAM



5. COMPLETE WORKING & OPERATION

The 1-phase 230V AC source connected to the energy meter. The energy meter output is connected to the relay module and the output of the relay gives the supply to the load. A 230V AC supply is given to the 230/12 V Step down Transformer (Buck Power Supply). Transformer converts 230 V AC to the 12 V AC. Then bridge rectifier converts 12 V AC to the 12 V DC. But we required 5 V DC for the ESP32 microcontroller so, the buck power supply is connected to the VR breadboard module that converts 12v DC to 5v Fix DC for NODE MCU.

The NODE MCU is connected with a relay module for wireless switching operation (on/off load) using the IoT database server and mobile application. A particular user ID and password of user is stored through programming in controller so that only an authenticated user can see the data of specific user ID. To store the data and represent it on internet Blynk IoT platform is used. As mentioned, ESP32 is provided with WI-FI facility, it will upload the data such as voltage, current, power consumed and bill of energy consumption on Blynk IoT, so that user can see it anytime from anywhere.

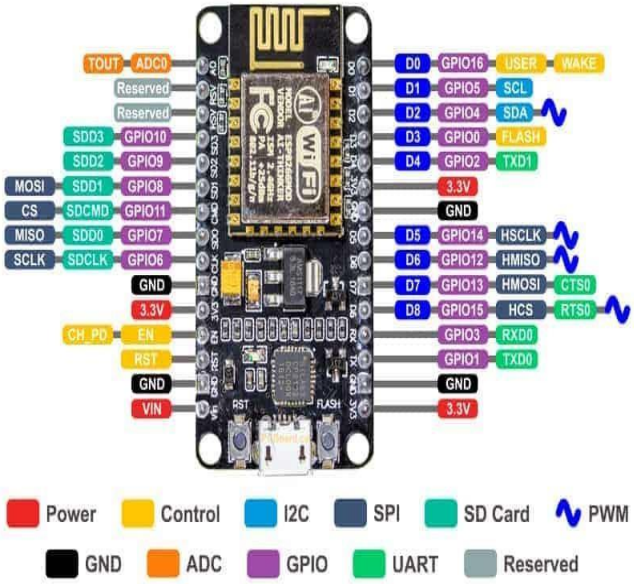


6. EQUIPMENT

6.1 ENERGY METER

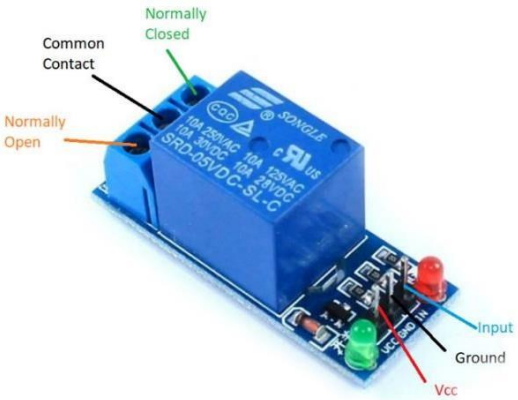
An energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device. Energy meters are typically calibrated in billing units, the most common one being the kilowatt hour (kWh). Energy meters operate by continuously measuring the instantaneous voltage (volts) and current (amperes) and finding the product of these to give instantaneous electrical power (watts) which is then integrated against time to give energy used (joules, kilowatt-hours, etc.). Meters for smaller services (such as small residential customers) can be connected directly in line between the source and the customer. For larger loads, more than about 200 amperes of load, current transformers are used, so that the meter can be located other than in line with the service conductors.

6.2 NODE MCU ESP8266



The Node MCU (***N***ode ***M***icro ***C***ontroller ***U***nit) is an open- source software and hardware development environment built around an inexpensive System-on-a- Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espress if Systems, contains the crucial elements of a computer: CPU, RAM, networking (Wi-Fi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds.

6.3 RELAY MODULE



Relay is one kind of electro-mechanical component that functions as a switch. The relay coil is energized by DC so that contact switches can be opened or closed. A singlechannel 5V relay module generally includes a coil, and two contacts like normally open (NO) andnormally closed (NC).

5V Relay Module Pin Configuration

The pin configuration of the 5V relay module is shown below. This module includes 6-pins where each pin and its functionality are discussed below.

Normally Open (NO): This pin is normally open unless we provide a signal to the relay modules signal pin. So, the common contact pin smashes its link through the NC pin to make a connection through the NO pin.

Common Contact: This pin is used to connect through the load that we desire to switch by using the module.

Normally Closed (NC): This NC pin is connected through the COM pin to form a closed circuit. However, this NC connection will break once the relay is switched through providing an active high/low signal toward the signal pin from a microcontroller.

Signal Pin: The signal pin is mainly used for controlling the relay. This pin works in two cases like active low otherwise active high. So, in active low case, the relay activates once we provide an active low signal toward thesignal pin, whereas, in an active high case, the relay will trigger once we provide a high signal toward the signal pin.

5V VCC: This pin needs 5V DC to work. So 5V DC power supply is provided to this pin.

Ground: This pin connects the GND terminal of the power supply.

6.4 12V-POWER SUPPLY

A buck converter is a step-down AC to DC converter. It uses a power semiconductor device as a switch to turn onand off the DC supply to the load. The switching action can be implemented by a BJT, a MOSFET, or an IGBT. Figure shows a simplified block diagram of a buck converter that accepts a DC input and uses pulse-width modulation (PWM) of switching frequency to control theswitch. An external diode, together with external inductorand output capacitor, produces the regulated dc output. Buck, or step-down converters produce an average outputvoltage lower than the input source voltage.

7. CONCLUSION

The project describes the desissgn and working of Smart Energy Meter and represents how Smart Energy Meter can be used for Automatic Meter Reading. It is the most economical implementation to develop mankind in this era of technology. With the present enhancement in the use of technology to facilitate mankind, it is an efficient and practical utilization of present networks. System is providing real time data and convenient billing system. Itprovides more accurate energy statistics and goodgovernance in billing system

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