Manage Electricity Bills with Smart Electricity Load Management Based on IoT

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ABSTRACT

The objective of this paper was managing the bills with smart load management based on IoT, Nowadays the demanding for electricity is increasing at a constant rate throughout the population and is being utilized for various purposes like in Collages, companies, agriculture, hospitals, and many other fields so by this we were facing many problems in load management and over reading in the meter is will be Detected. Because the consumption of electricity is high and due to this the over reading is will become in meter bills. Also, The Development of smart load Management has only been made possible due to the evolution of a digital meter. They will help in the implementation of software in embedded hardware. Hence smart load management helping with set the priority to a load. so they are useful in a way that if a load is high to a set limit, at the time the lowest priority is off and the load is maintain was low and no over reading is detected in meter and no any type of short circuit is happening they will sudden maintain load easily.

KEYWORDS: IoT, Microcontroller, Arduino, node MCU (WIFI Module), transformer, Current coi

1. INTRODUCTION

Now a Days the Demand of electricity is increased at a very high rate throughout the population and is being utilized for various purposes like in education, households, hospitals, and many others places .let if we take an example of houses then if we are ever starting to many home appliances at the same time then the short circuit is happening is because of the over load in a circuit. Our circuit is designed to handle the limited amount of electricity. An overload occurs when you draw more electricity and at that time the short circuit chances are more.

Let if the overload happens to any houses, so the overload would because the circuit wiring too overheat, which could melt the wire insulation because some different appliances having different load ratings. so some circuit is using more electricity than others circuit. so at that time, the things which we are using in for overload protection is a circuit breaker, fuse they can directly shut the main power of light in overload cases but our devices is not shut the main power of light they can manage the load with the help of priority setting to a load.

Some historical things also happen on this cases like some things also made to related to overload protection like as load management help with and R.F signal, help with microcontroller, Bluetooth and many others things but what we done we just introduced two new things is will be Wi-Fi module and setting the priority to a load. Let just talk about how we use the priority in this. So let just take an example of a house and the load which is uses by a whole house is will be around to 2KwH.so what we do in priority we just set the priority to a load which is using in houses like we just set the three priority and we set first priority to load which is very imp at that time and Second priority which are less than first and third priority which are not more imp at that time. so if the load is increased about to more than 2KwH of a total load of house, and also around 1.8KwH then our circuit is will be done switch off the lowest priority and the whole load is managed after is again the load is go high then second priority is will be also OFF and no overloading and short circuit are done so also no over reading is also detected in a bill of electricity. So if we are taking our project important is because any type of overload is happening then the chances of a short circuit are more happens and this causes a big fire in houses also a big problem is happening and also our life in a very big danger in this. And the second imp is no over reading is detected in this meter bills due to billing time so chances of over reading during high load are will below. Because we see several cases related to this type of activity and this type of short circuit can convert to a big fire and heavy damage is will be done in a family and the society many cases it will be done is related to short circuit due to

which the many fire cases happen in big buildings houses and others places.

2. METHODOLOGY

The aim of our project is to reduce or eliminate unplanned overload and over reading in meter via switching off the unnecessary equipment. There are many smart meters developed recently, many smart meters have the function of energy calculation, billing and sending data to the monitory station through wired and wireless communication. But these smart energy meters are not helpful in eliminating the over current and over reading in meter with help of priority. The load represents the devices that require electricity to operate. Hence given a priority to a load and each load has connected to the socket. Also, the second thing we have is our main controller is using to automate the power usage of the household. The second aim is to reveal the two-way communication between each individual socket and central system (main controller) and simultaneously retrieve data and matching among the sockets with the help of node MCU WIFI module and at mega 328. If any over reading and overload is detected the system updates the situation to the main controller where (at mega 328) present so they can turn off the load on the bases of priority with help of WIFI module. Also if any type of over reading or over current is will happen then at that time the IOT is will be switch off the lowest priority with the help of Triac due to and a over current is will not be happening also one more advantage of Node MCU is we can see which device is ON or OFF at a time on a server (local server).

2.1. BLOCK DAIGRAM
A. for each socket
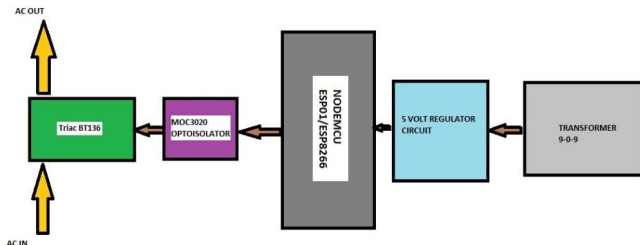
B. Main controller
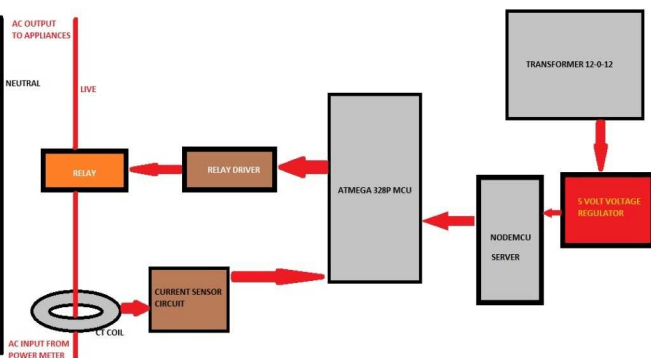
3. COMPONENTS
3.1. HARDWARE
THE COMPONENTS IS DIVIDED IN TWO PARTS:
1. FOR EACH SOCKET WE HAVE
A. Node MCU (WIFI module)
B. Triac BT 136
C. Driver MOC 30-20
D. Transformer 9V
E. Regulator
F. Led……. Etc

2. Main socket (controller)
A. Node MCU (WIFI module)
B. Micro controller (At mega 328)
C. LCD (16*2)
D. Keypad (4*4)
E. Current coil CT
F. Transformer……..etc

3.2. SOFTWARE

Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the Arduino programming language (based on Wiring) and the Arduino development environment (based on Processing). Arduino projects can be stand-alone or they can communicate with software on running on a computer (e.g. Flash, Processing, and Max MSP).

4. COMPONENT DETAILS
4.1. ATmega328:

The ATmega328 is a single-chip microcontroller created by Atmel in the mega AVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core.
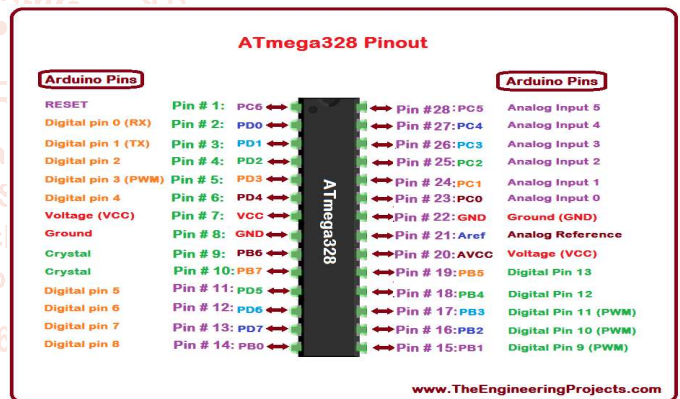

Fig4.1 Pin Diagram of Microcontroller

4.2. NODE MCU (WIFI MODULE):

Node MCU is an open source development board and firmware based in the widely used ESP8266 -12E WIFI module. It combines features of WIFI access point and station + microcontroller. These features make the node MCU extremely powerful tool for WIFI networking.
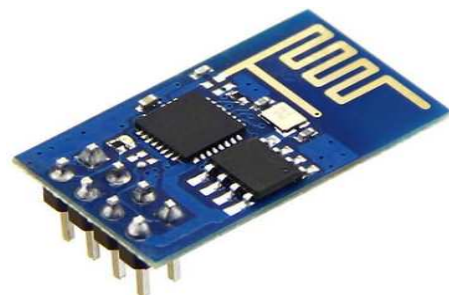

Fig4.2 Node MCU (Module)

4.3. TRAIC BT136:

The BT136 is TRIAC with 4A maximum terminal current. The gate threshold voltage of the BT136 is also very less so can be driven by digital circuits. Since TRIACs are bi-directional switching devices they are commonly used for switching AC applications
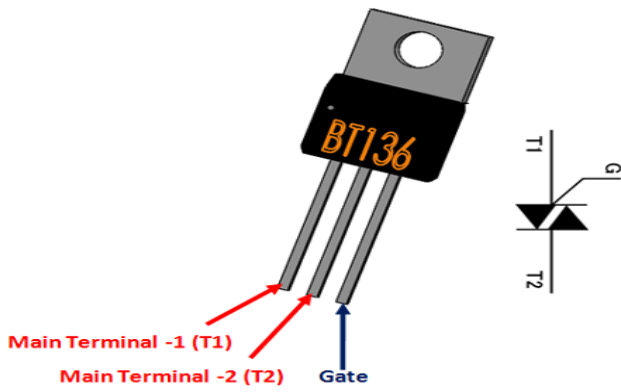
Fig4.3 BT136 (traic)

4.4. KEYPAD:
Used for set the priority to a load

Fig4.4 keypad

5. RESULTS
Tech knowledge we have an idea about how we will manage the load in a.c.so for that we used the advances load management techniques based on IoT in this we are using a socket in each load and set priority for that and for each socket the real-time monitoring is will be done. so if we put this circuit start then at that time each socket is will be checking the data with the main controller with the help of node MCU WIFI module continuously check data to the main controller with at mega 328. Because node MCU is will be creating a WIFI mesh so all thing is will be connecting to each other. hence if the load is will be high and over a limit then at that time the lowest priority load or socket is will be OFF with the help of relay and other things and also we can see which device is ON or OFF during operation on a server(local server) with help of node MCU.

6. CONCLUSION
The system is mainly intended for smart cities with public Wi-Fi hotspots. The project is base on the internet of things concept. This is aimed at replacing the old load management with an advanced load implementation. It can be used for automatic power reading by which one can optimize their power usage thereby reducing the power wastage and over current and over reading problems in a meter. The readings from the central system are updated to the WIFI module and then display on the LCD. And each load we will maintain separately without disturbing user comfort.

7. REFERENCES
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