

IoT Based Electricity Theft Prediction with Instant Billing Using Android App

¹R Shalini, ²R. Kannan

²Assistant Professor

^{1,2}Dept. of Electronics and Communication Engineering,
Saveetha School of Engineering, SIMATS Chennai, India

Article Info

Volume 83

Page Number: 5100-5104

Publication Issue:

May - June 2020

Abstract

We implement a system in this paper that estimates the current consumption level by means of the voltage and current sensor unit. The sensor is mounted in the EB meter. This paper suggests the smart energy meter with reading indication using IoT built to minimize the power consumption bill by providing the consumer with a warning message for reading the energy meter before increasing the unit cost. We can get the current consumption by getting the value of the sensor. After receiving current consumption, the unit given to specific user will be reduced by the Arduino UNO. The unit is considered as a numerical value. If the unit is lowered to minimal, an IoT module and Android Mobile will intimate the user. If the consumer is planning to add more units he / she will send a warning message to the EB portion. The necessary value would be carried from the EB section to the Arduino controller via IoT modem. From the value obtained, Arduino UNO tends to improve the memory unit. For less manual interventions, the replacement process is completed easily. It is possible to use our system in industrial control, healthcare system and access control. Reading live meters from the IoT-enabled energy meter is returned to this charging point on a regular basis, and these information are stored in a database. Furthermore, the user can track the progress of electricity from anywhere. It makes reading the meter simple and precise.

Article History

Article Received: 19 November 2019

Revised: 27 January 2020

Accepted: 24 February 2020

Publication: 16 May 2020

Keywords: IoT, Home, Sensors, Arduino UNO, Android.

1. Introduction

E-meter innovation has progressed significantly from more than 80 years back. There have been numerous advancements from the first heavy meters with huge magnets and loops that, notwithstanding improving great highlights, have brought about size and weight decrease, and critical improvement in meter goals and precision have happened throughout the years. In the latter part of the last century, the development of the computerized meter changed the manner in which electrical parameters are utilized. . The electronic E-meter, Voltmeters and Ammeters, has ruled the entire scope of estimating instruments because of its preferences, for example, simplicity of perusing, improved goals and vigorous plan. The appearance of the Electronic Energy Meter in the mid-eighties is of specific significance. Due to the

massive difference in energy demand and supply, consumption of energy and distribution has now become a big subject for discussion. In such manner, energy purchasers are confronting such huge numbers of issues because of the periodic power outages; another significant purpose behind frequent blackout is because of the un-constrained energy utilization of rich individuals. In this viewpoint, to limit the power cuts and to circulate the energy similarly to all zones, some limitation ought to have over the force utilization of every single energy consumer, and as per that the Government should execute an arrangement, by presenting Autonomous Energy Meters wherever in household division. Therefore, the need has come to think and an answer needs to emerge. Smart energy meter can take readings easily and we can reduce the misuse of power

and also here we can significantly reduce the user's bill by reminding them with an alert message before increasing the system charge.

2. Literature Survey

In [1] S. V. Anushree and T. Shanti recommended a thought by sending alert SMS to the owner to perceive the theft. Send meter reading and rate every month to the proprietor. Electricity theft has a material expense and safety effect on consumers.

In [2] Prof. Prashant Patil, S.R. Kurkute suggested that Automated Energy Meter Reading System (AEMR) read the energy meter on a regular basis and calculate the total bill amount at the set deadline and gives the service provider a memo.

In [3] Nathan Silberman, Kristy Ahlrich, Rob Fergus and Lakshmi Narayanan Subramanian states that energy meters already installed in our houses are not being replaced, but a minor change on the existing meter will turn that into smart meter. The utilization of Wireless module gives a feature of warning through SMS. Through the web page we designed, one can easily access the meter. Current perusing with cost can be seen on website page. Programmed ON and OFF of meter is conceivable. Limit esteem setting and sending of notice is the extra undertaking that can be achieved.

3. Existing System

In the existing energy usage data collection scheme, Tamil Nadu Electricity Board representatives come and visit every residential monthly, takes the snap of the data and calculates the data consumption of the meter manually.

This collected data is recorded with a snap of the meter on a piece of paper and submitted to the local Tamil Nadu Electricity Board office. After the official reads the readings of the snap and meter and then gives it to the local software for bill calculations and receipt generation. We then make the payment as a consumer for the received bill.

A. Disadvantages

- Human need is required.
- Can't control the electricity limit in industries and homes.
- Electric bills are not maintained properly.

4. Proposed System

In this proposed System, we can easily find out power theft. Let consider we obtain the fixed rate of units from the transformer and then that will be able to split into separate units (Houses). If any mismatch occurs while calculating the unit rate from primary supply (Transformer) to separate unit (home unit) means we can identify about the power theft easily. The rate of usage will be displayed by using Android Mobile.

If an area suffered by Power shut down complication means each and every unit get an alert. If the user fails to make a payment for usage of Current rate within a deadline means automatically power supply goes on particular home will be OFF Mode after make a payment only the power supply will be ON.

If we supposed to fix default unit to separate units, for an example each unit fixed with 2500Watts means while reached 2000Watts it gets an alert and then, automatically the flow of power will be terminated.

A. Advantages

- Automation has been evaluated. Therefore, it will reduce the chance of human error and corruption.
- In the extremely terrible climate conditions like snowstorm, inundation, storm, and so forth the system won't hamper on gathering.
- Illegal Social activity avoided (Power Theft).

5. Block Diagram

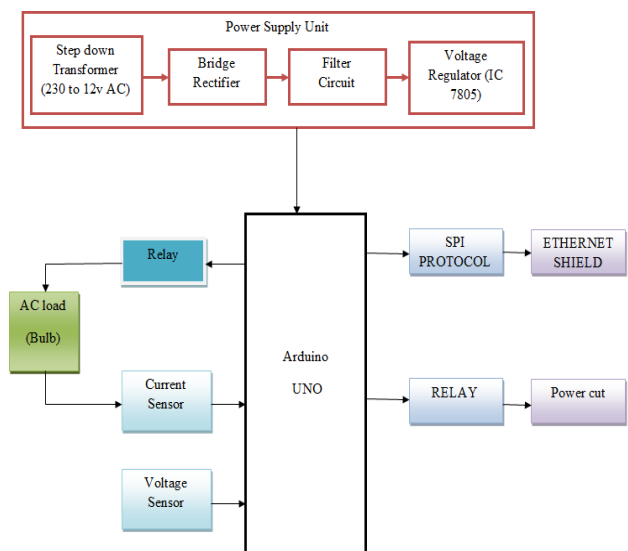


Figure 1: Block Diagram –Main Unit

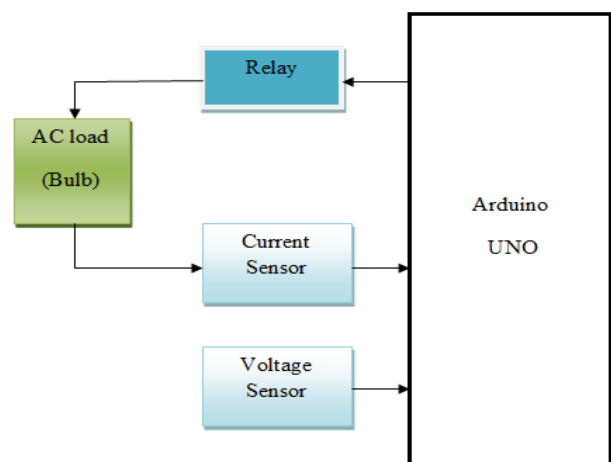


Figure 2: Block Diagram –Server Unit



Figure 3: Receiver Unit

6. Module Description

A. Power Supply Unit

In an electronic system, the DC power supply unit is converted to each stage. Hence the DC power supply circuit will be a mandatory requirement for all these phases. A battery can be used to run any low-power system. Nonetheless, batteries could be expensive and complex for long-term operating devices. The best method used is in the form of an unregulated power supply – a combination of a step down transformer, bridge rectifier and an electrolyte filter.

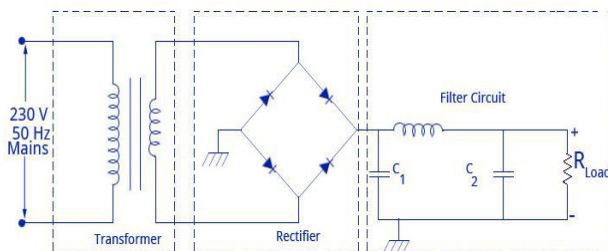


Figure 3: Power supply Unit

B. Arduino UNO

Arduino microcontroller is open source PC equipment and programming organization, undertaking, and client network framework that structures and produces single-board microcontrollers and microcontroller units for building advanced gadgets and intelligent items that can detect and control questions in this world. The undertaking's items are dispersed as open-source equipment and programming, which are authorized under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), allowing the assembling of Arduino sheets and programming appropriation by anybody. Arduino sheets are accessible financially in preassembled structure, or as do-it-without anyone else's help (DIY) packs.

Arduino UNO plans valuable for a variety of chip and controllers. The boards are engaged with sets of computerized and simple input/output (I/O) pins that can be interfaced with various sheets of development (shields) and different circuits. The sheets highlight sequential correspondence interfaces on certain gadgets, including Universal Serial Bus (USB), Serial Peripheral Interface (SPI), additionally used to stack programs from PCs. Ordinarily, a programming language vernacular of highlights C and C++ is utilized to program microcontrollers.

Arduino Uno R3 Pinout

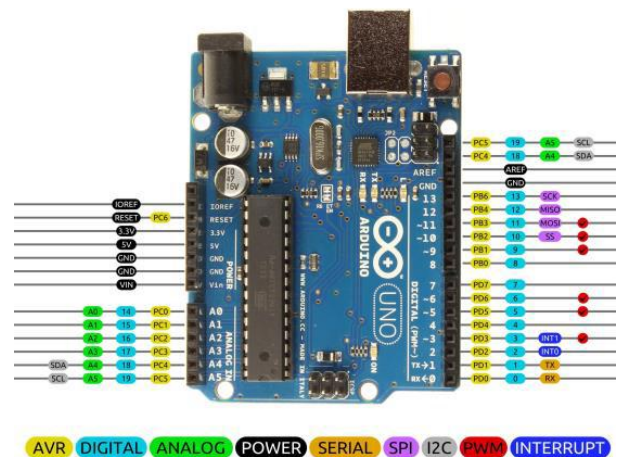


Figure 4: Arduino UNO

C. Current Sensor



Figure 5: Current Sensor

A flow sensor is a gadget that recognizes and creates a sign in a wire that is corresponding to the electrical flow (AC or DC). Simple or current voltage, or even advanced yield, might be the sign created. It would then be able to be utilized to show the deliberate current in an ammeter or put away for additional investigation in an information procurement framework or can be utilized for motivations behind control.

D. Voltage Sensor

The voltage Sensor utilizes only electronic parts. The voltage to be estimated is legitimately applied to the

sensor terminals: +HT (positive high voltage), - HT (negative high voltage or ground) the primary voltage undergo an insulated Amplifier, is changed over into the yield current is relatively to the info signal. The primary supply of the essential segment of this sensor is galvanic protected. This rule is called static voltage detecting.

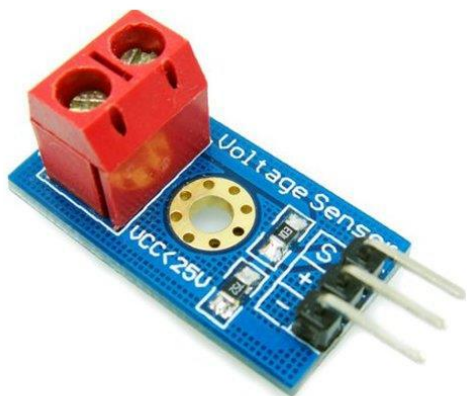


Figure 6: Voltage Sensor

E. Relay

A relay is only an electrically worked change to control engine and so forth. Numerous transfers utilize an electromagnet to work a switch, however other working principles are likewise utilized, for example, strong state transfers. Relay are utilized where it is important to control a circuit by a different low-power signal, or where a few circuits must be constrained by one sign. The primary transfers were utilized in long separation broadcast circuits as intensifiers: they rehashed the sign rolling in from one circuit and re-transmitted it on another circuit. Relay were utilized widely in phone trades and early PCs to perform sensible activities.



Figure 7: Relay

F. SPI Protocol

Successive Peripheral Interface (SPI) is an interface transport routinely used for data transmission among microcontrollers and little peripherals, for instance, move registers, sensors, and SD cards.

G. Ethernet Shield

The Arduino Ethernet Shield allows an Arduino board to connect with the web affiliation. It relies upon the ethernet chip of Wiznet W5100/W5200 which gives a framework stack (IP) prepared for both TCP and UDP. Use the Ethernet library to make depicts using a RJ45 Ethernet jack to connect with the Internet.

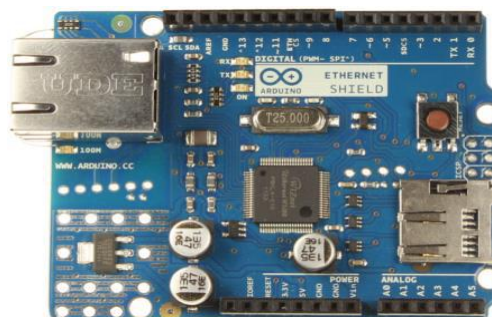


Figure 8: Ethernet Shield

7. Result and Discussion

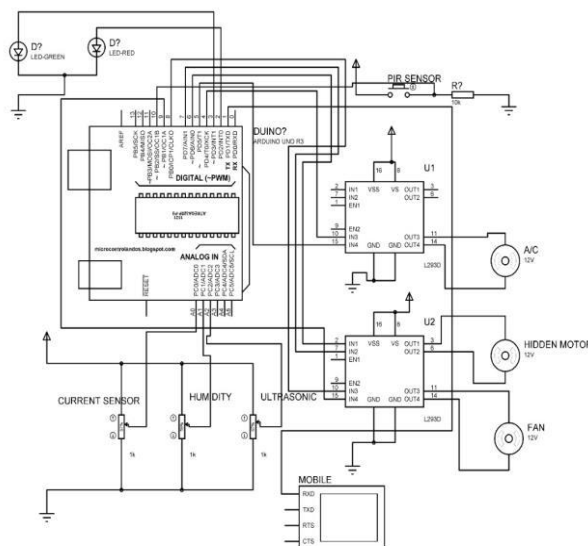


Figure 9: It shows that simulation circuit for this method.



Figure 10: It showing the electricity theft prediction with instant billing using android application

8. Conclusion

In the improvement of smart city, our task is focused on the web availability and systems administration factor of the IoT. In this framework, a power and force utilization estimation dependent on the tallying of alignment beats is structured and actualized utilizing ATMEGA328P based Arduino Microcontroller unit in inserted framework area. In the proposed work, a meter reading system based on IoT and Microcontroller is designed to monitor the meter reading continuously and the service provider can disconnect the power source when the customer fails to pay the monthly bill and furthermore avoids human inclusion, gives sufficient meter perusing, limits the charging blunder.

References

- [1] S. V. Anushree, T. Shanthi, "IoT Based Smart Energy Meter Monitoring and Theft Detection Using ATMEGA", IJIRCCE, 2016.
- [2] Prof. S.R.Kurkute, Gopal Girase, Prashant Patil, Automatic Energy Meter Reading System Using GSM Technology, IJIREEICE, 2016.
- [3] Birendrakumar Sahani, Tejashree Ravi, Akibjaved Tamboli, Ranjeet Pisal, "IoT Based Smart Energy Meter", IRJET, 2017.
- [4] M.Leelavathi, K.Aswini, "Smart Energy Meter with reading indication using GSM", IRJET, 2015.
- [5] Dr. Dilip D.Chaudhary, Sudarshan Vitthal Gite, "Smart Electric Meter Reading and Monitoring", IJAREEIE, 2016.
- [6] G.Vani, V.Usha Reddy, "Application of Smart Energy Meter in Indian Energy Context Authors", IOSR-JEEE, 2015.
- [7] Shikha Rastogi, Manisha Sharma, Pratibha Varshney, Internet of Things based Smart Electricity Meters, IJCA, 2016.
- [8] Jithin Jose K, Leneesh Mohan, Nijeesh U K, Tony C Benny, Smart Electricity Meters, IJETT, 2015.