IJAREEIE

e-ISSN: 2278-8875
p-ISSN: 2320-3765

International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

Volume 12, Issue 2, February 2023

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.18

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.18|

||Volume 12, Issue 2, February 2023||

|DOI:10.15662/IJAREEIE.2022.1202007|

Energy Meter and Power Theft Monitoring

Rohit Andore[1], Mrs. S.S. Kulkarni[2], Dr.A.G.Thosar[3]

Department of Electrical Engineering, Government College of Engineering, Aurangabad, Maharashtra, India

Department of Electrical Engineering, Government College of Engineering Aurangabad, Maharashtra, India

Department of Electrical Engineering College of Engineering, Pune, Maharashtra, India

ABSTRACT: A Electricity companies lose a significant amount of revenue due to unauthorized connections or customer dishonesty for personal gain. In poor countries, power theft is a huge problem. It is illegal to steal electricity. A country's GDP suffers greatly when power is stolen. As a result, preventing power theft is critical for ensuring an uninterrupted supply of high-quality power around the world. The purpose of this study is to present a review of the literature on power theft detection. Bypassing and hooking are the two most common ways for power theft. In this paper, we have looked at various methodologies that can be useful in solving the given problem.

KEYWORDS: Power Theft Detection, Various Methodologies, Transmission Losses.

I.INTRODUCTION

We can't fathom modern life without electricity; practically all of the goods, equipment, and appliances we use on a daily basis rely on ELECTRIC power to function properly. Electricity has been a vital component of our lives since its invention. Solar energy is an option, although it has drawbacks such as environmental impacts and a high initial cost. From electric toothbrushes to large motors, everything in today's society is powered by electricity. So, as the consumption of energy grows from rural to urban, and from home to industrial locations, so does power theft. "Transmission Losses" resulting from illegal connections or tampering account for up to 42% of total electricity generation in the United States, and can also be described as 23% through total transmission and distribution losses, with certain states losing more than 50%. Power theft is a non-illegal method of obtaining energy for various purposes such as transmission and distribution, resulting in losses for utility companies, which include both technical and non-technical losses. The global loss is estimated to be every year [1].

II. II.LITERATURE SURVEY

Vivek Kumar Jaiswalet al. [2] propose a method for detecting power theft, alerting the consumer, and cutting off the power supply as needed. When unauthorized actions are detected separate message is sent back to the microcontroller to cut off the unlawful supply, and an SMS is immediately sent to the user via the GSM module. Sreemoyee Bose et al. [3] proposed a dependable method for detecting power theft in a low voltage consumer network by hooking and passing an electric meter. The energy meter is placed between the two LC traps in this method. Jaya Deepthi B et al. [4] propose using Arduino and a GSM module to detect energy theft. An LCD is provided to display power usage data as well as power theft data, i.e., the consumer load and theft load, which are sent to the GSM module, are different.
Nikhil V. Patil et al. [5] present an Intelligent Energy Meter (IEM) that provides a solution for maintaining power quality, superior metering and billing, and power theft control An experimental setup using an intelligent energy metre model, GSM, and Arduino supports this claim B. Naseem Khanet al. [6] proposed a GSM-based system that integrates digital energy meters installed at consumer units with power supply companies to monitor, profile, and control energy flow using a Graphical User Interface (GUI). In this two-way communication system, the GSM network is used to By sending the energy supplier an SMS, you may profile the energy flow and use the GUI to present it on their monitor.

III. SYSTEM ARCHITECTURE

Figure 1 depicts the proposed system's block diagram, while Figure 2 depicts hardware implantation. The energy meter has standard unit consumption ratings, such as 3200 imp/kWh. The underlying principle is the calibrating LED blinks 3200imp/kWh meter. But In this case, the project is based on 32imp/kWh for domestic use. A Liquid Crystal Display is a display that operates in its first.

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.18|

||Volume 12, Issue 2, February 2023||

|DOI:10.15662/IJAREEIE.2022.1202007|

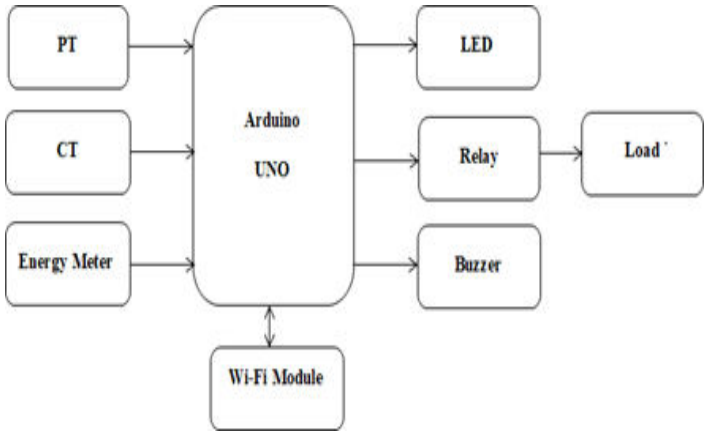


Figure [1] - Block diagram of system

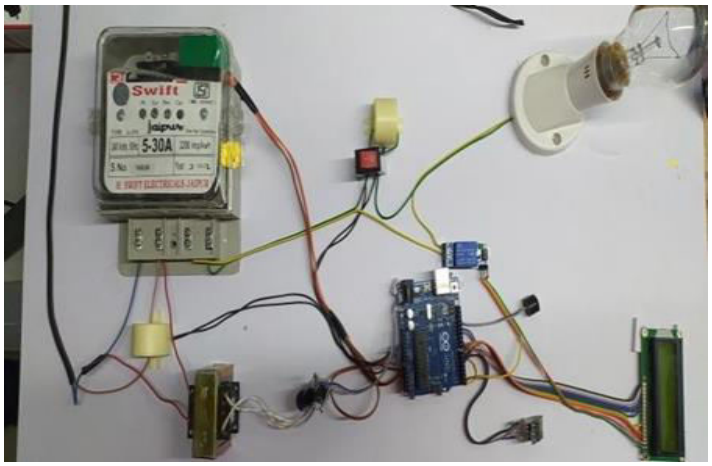


Figure [2] - Hardware Implantation of System

A. Energy Meter

The usual rates for unit consumption on the energy meter include the 3200 imp/kWh. The 3200imp/kWh calibrating LED blinks meter is what drives this. The project is carried out in this instance at 3200imp/kWh for home purposes. As soon as the calibrated LED blinks 35 times, the meters reads one unit.

B. Arduino (Uno R3)

The open-source Arduino platform is used to create electrical projects. In order to create and send computer code to the physical board, the Arduino system comprises of a software application called the IDE (Integrated Development Environment) that runs on our computer. The actual programmable circuit board is sometimes referred to as a microcontroller.. With those just getting into electronics, the Atmega328p has grown rather popular, and for valid reason. The Arduino does not require a separate hardware component (referred to as a programmer) in order to upload fresh code onto the board; instead, you may do it by using a USB cable, unlike the majority of earlier programmable circuit boards. Plus, the Arduino IDE employs a condensed form of C++ that makes learning to programmer simpler. The Uno is a popular board in the Arduino series and a fantastic option for novices. Finally, Arduino offers a standard feature set that separates the operations of a micro-controller into more approachable packaging..

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.18|

||Volume 12, Issue 2, February 2023||

|DOI:10.15662/IJAREEIE.2022.1202007|

C. Voltage Transformer or Potential Transformer

Voltage transformers are another name for potential transformers. Fundamentally, it is an extremely precise turn ratio step down transformer. a typical measurement tool for gauging step-down transformers voltage changes from greater level to lower magnitude. More main turns and fewer secondary turns are used in the approach to make it function. Higher voltage and current values cannot be directly measured.

D. Wi-Fi module

The maker of this Wi-Fi module, that enables embedded IoT applications, is Espressif Systems. A 2.4GHz radio is present. 32-bit RISC CPU based on Tensilica xtensa L106 for Wi-Fi. It is a cheap standalone wireless transceiver with 64 kilobytes (instructions), 96 kilobytes (data), and 64 kilobytes (boot) of RAM. For the Wi-Fi module in use.

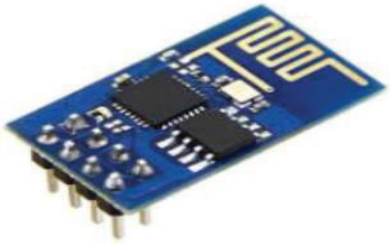


Figure [3] – Wi-Fi module

IV.CIRCUIT CONNECTIONS AND POWER CALCULATION

The block diagram for the project Power Measurement with Arduino is displayed below. 100-watt lights serving as resistive loads make up the load circuit. A single phase 230V alternating current source powers these loads. The current and voltage passing through the load are decreased to safe levels using a current transformer and a potential transformer. We can set the unit's price with the help of buttons. When we start the system, the IOT screen displays reading, voltage, current, bill, Unit, CT1 current, CT2 current, power theft, and meter tampering. Reading will be altered as time passes. Energy theft will be detected and displayed on the IOT screen if it occurs. On thingspeak. Even information will be received via Wi-Fi. Following receipt of the alert, the buzzer will sound.

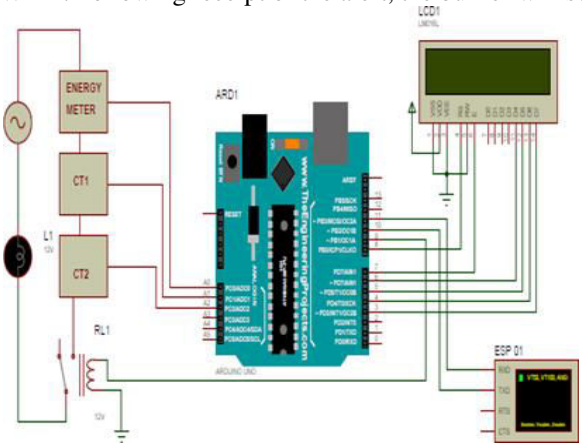


Figure [4] - Circuit Connections

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.18|

||Volume 12, Issue 2, February 2023||

|DOI:10.15662/IJAREEIE.2022.1202007|

V. RESULT AND DISCUSSION

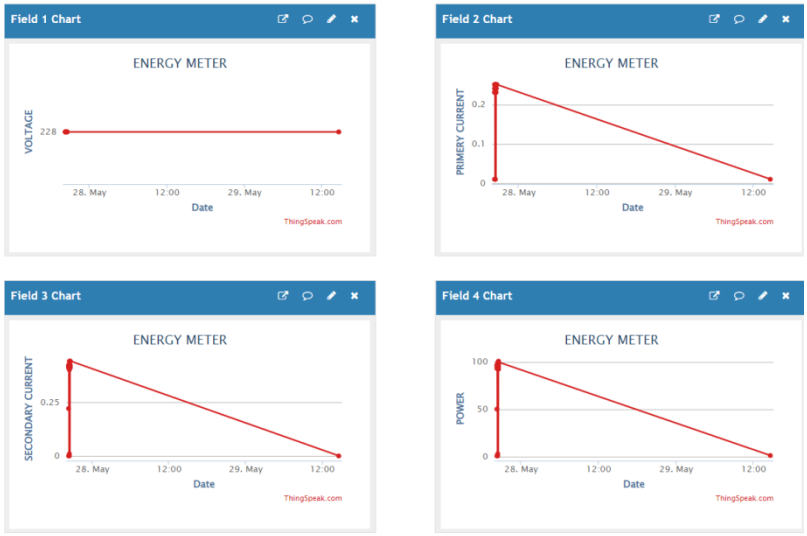


Figure [5] –Result Graphs

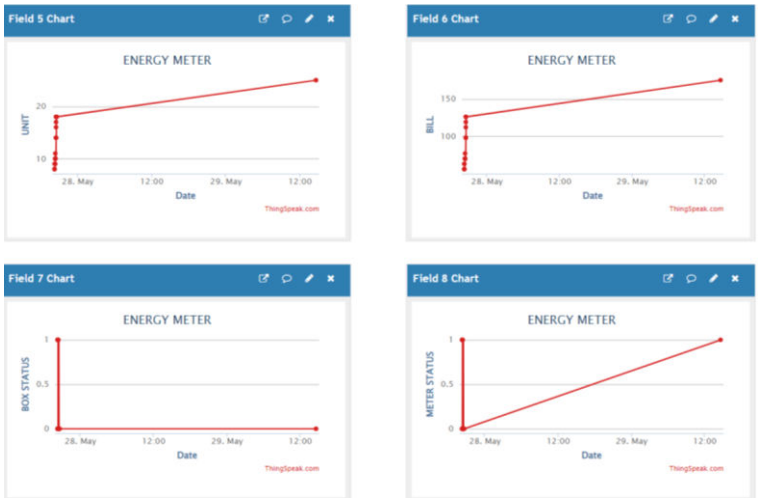


Figure [6] –Result Graph

The realization of this piece is shown. We must first create a MathWorks account before we can create a ThingSpeak account. Next, an ID and password are made shore along with a channel called "intelligent irrigation system" that is in private mode. If someone tries to steal that form of theft stated on their ID, we must first connect to Wi-Fi before connecting the Wi-Fi module to the channel created by its API key in order to exchange data. Field Chart [1] displays the meter's voltage status. Field chart

[2]Shows primary current status, Field chart[3]shows Secondary current status, Field chart [4] shows Power of the meter, Field chart[5]shows Unit consumption of the consumer, Field chart [6] shows Unit consumption, Field chart [7] shows Box status. Fieldchart[8]shows Meter status.

VI.CONCLUSION

With this approach, the enormous power and financial losses brought on by customer power theft are reduced. According to this approach, power theft may be successfully stopped by identifying its sources and alerting the

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.18|

||Volume 12, Issue 2, February 2023||

|DOI:10.15662/IJAREEIE.2022.1202007|

appropriate authorities. The suggested system will be concealed and compactly sized in electric meters so that when the current difference exceeds a predetermined threshold value, an automatic data backup will be made to the cloud with all graphs, which will track primary current, secondary current, unit, bill, meter status, box status, power, and current.

REFERENCES

[1] Ms. Aishwarya P. Kamatagi **"**Development of Energy Meter Monitoring System (EMMS) for Data Acquisition and Tampering Detection using IoT" 978-1-7281-6828-9/20 IEEE International Conference on Control Science and Systems Engineering.

[2] (Srividyadevi P.) "Measurement of Power and Energy Using Arduino" Research Journal of Engineering Sciences (ISSN 2278– 9472) Vol. 2(10), 10-15, October (2013).

[3] Rahman, Noor-E-Jannat, Islam, & Salakin, 2015) Md. Masudur Rahman; Noor-E-Jannat; Mohd. Ohidul Islam; Md. Serazus Salakin. "Arduino and GSM Based Smart Energy Meter for Advanced Metering and Billing System". 2nd Int'l Conf. on Electrical Engineering and Information & Communication Technology (ICEEICT) 2015 Jahangimagar University, Dhaka-I 342, Bangladesh, 21-23 May 2015.

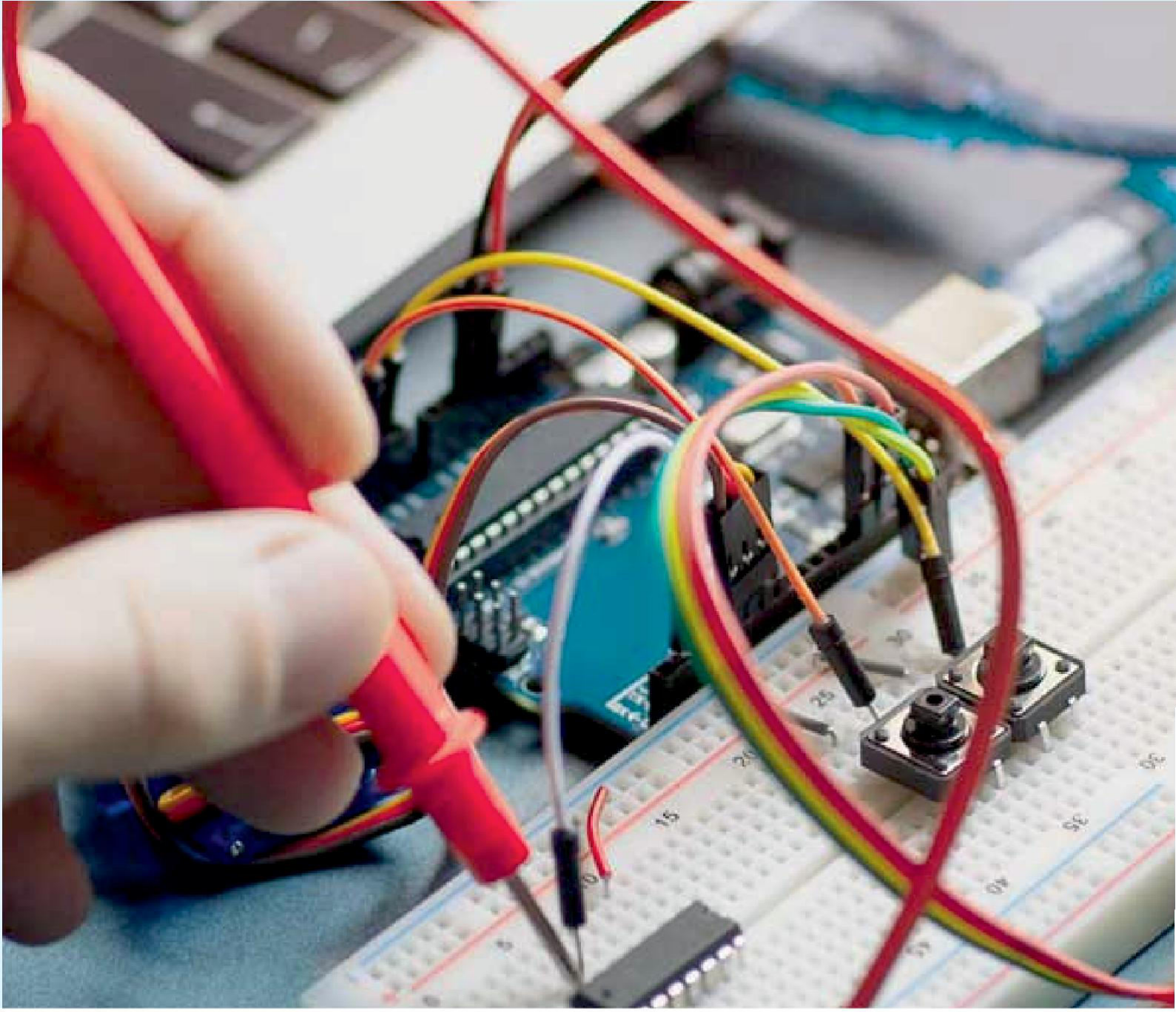
[4] Abhinandan Jain, Dilip Kumar and Jyoti Kedia "Smart and Intelligent GSM based Automatic Meter Reading System" International Journal of Engineering Research & Technology (IJERT), Vol. I Issue 3, pp. 1-6, May 2012

[5] N.Langhammer and R.Kays,"Performance Evaluation of Wireless Home Automation Networks in Indoor Scenarios", IEEE Transactions *on Smart Grid*, vol. 3, pp. 2252-226, 2012.

[6] Bibek Kanti Barman "IOT Based Smart Energy Meter for Efficient Energy Utilization in Smart Grid" IOT Based Smart Energy Meter for Efficient Energy Utilization in Smart Grid 10.1109/EPETSG.2018.8658501

[7] 1Nitin K Mucheli, 1Umakanta Nanda, 2*D Nayak, 2*P K Rout, 2S K Swain, 2S K Das, 2*S M Biswal "Smart Power Theft Detection System" 2019 Devices for Integrated Circuit (DevIC), 23-24 March, 2019, Kalyani, India

[8] Visalatchi S , Kamal Sandeep K Assistant Professor. "Smart Energy Metering and Power Theft Control using Arduino & GSM" 2017 2nd International Conference for Convergence in Technology (I2CT) DOI10.1109/I2CT.2017.8226251.



INNO SPACE
SJIF Scientific Journal Impact Factor

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

Impact Factor: 8.18

International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

9940 572 462 6381 907 438 ijareeie@gmail.com

www.ijareeie.com

Scan to save the contact details