

A NOVEL APPROACH FOR PREVENTION OF ILLEGAL POWER MINING AND LINEMAN SAFETY

MEGALA.J¹, PRABHA.A², KAMALAKANNAN.R³
Associate Professor^{1, 2}, Assistant Professor³, Dept. of EEE,
S.A Engineering College (Autonomous), Chennai-77.

megala271@saec.ac.in, prabhaa@saec.ac.in, kamalakannanr@saec.ac.in

Abstract— Power mining is a barefaced difficulty in electric power systems, which cause great economic losses and leads to uneven provider of electricity. Power mining can be briefly clear as usage of power without the information of the supplier. It has turn into the major trouble in India and it is an offence. Overall India has highest losses about 16.2 crore rupees. Power mining can be happening in several ways one such way is that registered customers steal either bypass the meter (i.e.) connecting around the meter to a live cable on a company side of the meter or tamper with the meter to make the meter to read less or no utilization. In order to eliminate the power stealing it has to be recognized. In this paper Arduino Mega is fixed with current sensors whenever the voltage level get increased power theft is detected. Protection of human life is of supreme value. In high power electrical line, circuit breaker is a major protection one. To prevent accidental switching on/off circuit breaker by unauthorized workforce. This paper proposed for a more life security for lineman.

Keywords: Arduino mega, GSM, RFID, MCB, Current sensor, Energy meter

I. INTRODUCTION

The proposed work in this paper aims on the plan and fulfilling the model of electrical energy larceny detection aspect. A high percentage of electricity income is lost due to power purloin and improper treatment. However, a bulk of these losses is caused by electricity theft [1]. The felonious usage of electricity must be solved by electronic means, without any human interplay. The purpose of this work is to provide an enactment process for electricity theft detection and controlling which allows violators to be detected at a remote location [2]. This design integrates effective solutions for problems faced by electricity distribution system such as power larceny and transmission line fault. It includes microcontroller based embedded technology and wireless communication method to search out the electric larceny and transmission line fault [3]. In the proposed method a Global System for Mobile communication (GSM) based technology is used to transmit the detection alert automatically to the authorized energy provider via an alert message which banish the various issues related to the meter reading and larceny detection [4]. The lineman is directly directed to high voltage load connections. In some cases, without the knowledge of the lineman the circuit breakers were turned on, due to which the lineman's life are becoming very critical [5]. There is no proper instrument or system to detect the power theft in the current system. India's electricity loss stands 3rd place in the list of losses. In the current system the electricity loss is the unidentifiable scam happening in India. Anybody can theft the power very easily [6].

II. SYSTEM COMPONENTS

2.1 ARDUINO MEGA

The Arduino Mega is a microcontroller has 54 digital input/output pins, 16 analog inputs, 4 UARTs, 16 MHZ crystal oscillator, a USB connection, a power jack, an

ICSP header, and a reset button. It contains the whole thing needed to support the microcontroller; just fix it to a computer with a USB cable or power it with AC to DC adapter or battery to get started [7].

2.2 ACS712 – CCURRENT SENSOR

ACS712 Component uses the famous ACS712 IC to measure current by using the principle of Hall Effect. The module gets its name from the IC (ACS712) used in the module, so for your final products use the IC directly instead of the module. ACS712 component can measure current AC or DC current fluctuating from +5A to -5A, +20A to -20A and +30A to -30A.

2.3 16 x 2 DISPLAY WITH I2C

16x2 LCD show screen with I2C interface. It can be able to show 16x2 characters on 2 lines, white characters on blue background. Usually, Arduino LCD display projects will lane out of pin resources merely, particularly with Arduino Uno. And it is also very difficult with the wire soldering and assembly. This I2C 16x2 Arduino LCD Screen is with an I2C communication interface. It wants 4 pins for the LCD display: VCC, GND, SDA, SCL. It except at least 4 digital/analog pins on Arduino. All connectors are standard XH2.54 (Breadboard type).

2.4 GSM MODULE

A GSM modem or GSM module is a hardware device that uses GSM mobile telephone technology to provide a data link to a remote network. From the sight of the mobile network, they are fundamentally identical to a normal mobile, including the need for a SIM to recognize themselves to the network. GSM modems classically deliver TTL-level serial interfaces to their host. They are usually used as part of an embedded system.

2.5 RFID MODULE

Radio Frequency Identification system contains two main components, a transponder/tag attached to an object to be recognized, and a Transceiver also known as interrogator/Reader. A Reader involves a Radio

Frequency segment and a probe that produces a high-frequency electromagnetic field.

2.6 SINGLE PHASE ENERGY METER

The induction principle treasures its broadest application as an energy meter. Induction type energy meter used consistently to measure the energy used up in any a. c. circuits in a decided period where supply voltage and frequency are constant. The energy meter is an integrating instrument that measures the total quantity of electrical energy supplied to the circuit in a given period [9].

2.7 MCB (MINIATURE CIRCUIT BREAKER)

Miniature Circuit Breaker (MCB) is an automatically operated electrical switch used to protect low voltage electrical circuits from damage caused by excess current from a short circuit. MCBs are typically rated up to a current up to 125 A, do not have adjustable trip characteristics, and can be thermal or thermal-magnetic in operation.

2.8 RELAY

The main operation of this device is to make or break contact with the help of a signal without any human participation in order to switch it ON or OFF. It is used to manage a high- powered circuit using a low power signal.

III. METHODOLOGY

In the existing system, there were many unauthorised tapping were taken which is also called as power theft [10]. In order to detect and identify the power theft were under driven to this proposal. In this system we are going to use two current sensors. Fig- 3.1 represents the block diagram.

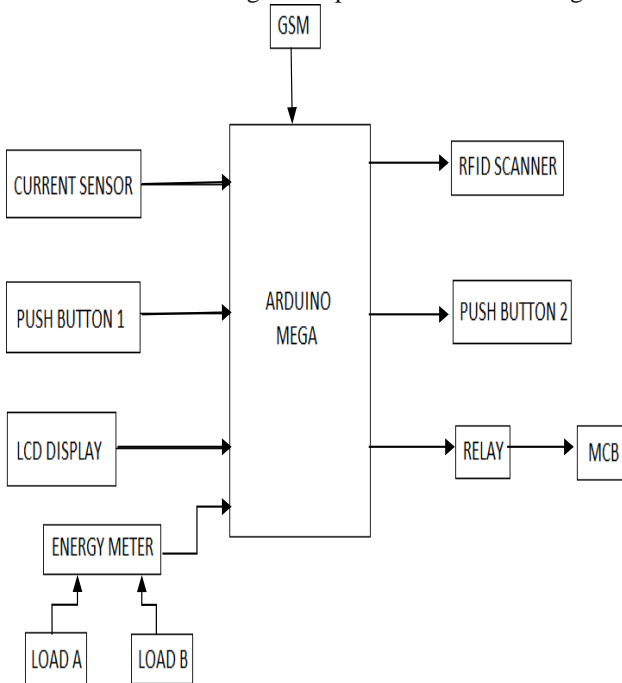


Fig. 1. Block Diagram of Working System

Due to this case, lineman life ends in risk [11], [12], [13]. To rectify this issue, we have designed RFID (Radio Frequency Identification) based protected circuit breaker. One will be place in the phase out from the

energy meter and another will be placed on the phase out of the MCB (Miniature Circuit Breaker) which is connected to the load. If the power theft is not taken place, the value of both the current sensor will be same. If anyone tapped the power the current value in the energy meter side will be increased. In that point, notification will be sent to the respective person. We are designing a Protection based circuit breaker for the purpose of increasing the Lineman safety, who is working in the power line. When the lineman is working in the power line, without knowledge anyone can turn ON the breaker.

IV. FLOW CHART

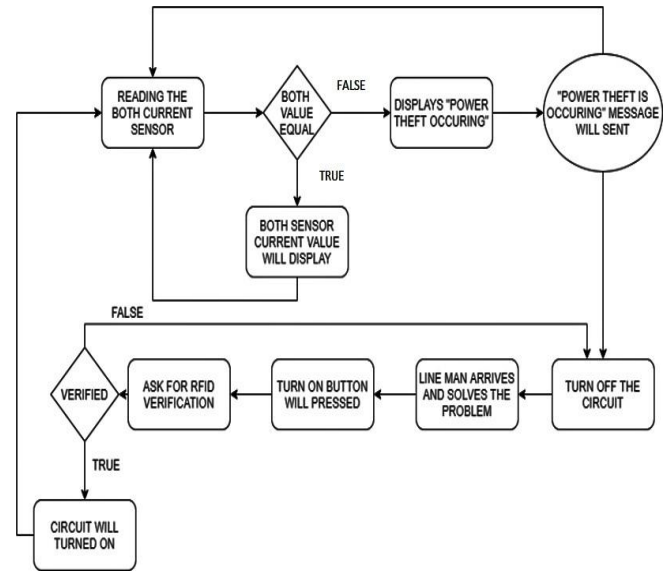


Fig. 2. Flow Chart for Proposed System

The above Fig- 2 shows the flow diagram for our proposed system.

V. RESULT

The output for illegal power mining is shown in Fig- 5.1. It shows the result for illegal power mining by sending SMS through GSM module.

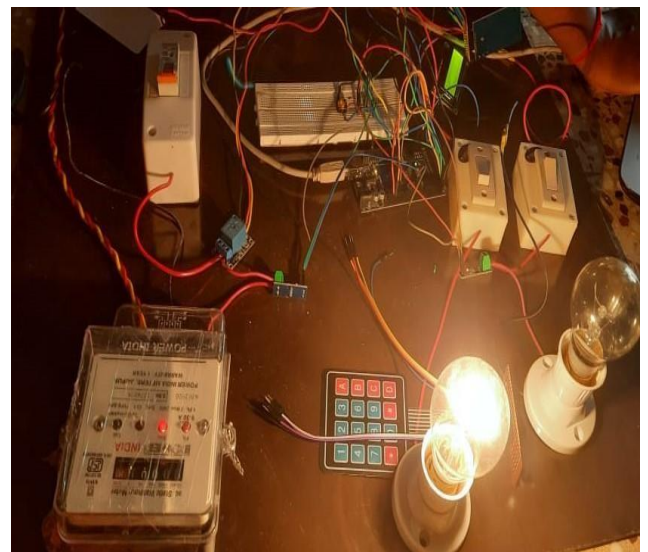


Fig.3. Output

VI. CONCLUSION AND FUTURE SCOPE

This proposed project has delivered the solution for the insecure safety of the lineman and paved a way for detection of industrial power theft. This will help to predict and ensure that the lineman safety is become more secured. The power theft detection is not only used for industrial purpose it can also implemented in domestic purpose also. Hence the improvement of lineman safety and automatic power theft detection is accomplished. The future scope for this project is to introduce Artificial Intelligence in power mining and wearable technology to protect the lineman from electrical line accidents.

REFERENCES

- [1] Vivek Kumar Jaiswal; Hritik Kumar Singh; KuldeepSingh, "Arduino GSM based Power Theft Detection and Energy Metering System", 2020 5th International Conference on Communication and Electronics Systems (ICCES), [2020] [MAIN PAPER]
- [2] B Jaya Deepthi; J Ramesh; P Chandra BabuNaidu, "Detection of Electricity Theft in the Distribution System using Arduino and GSM", 2019 International Conference on Computation of Power, Energy, In, formation and Communication (ICCPEIC), [2019]
- [3] Gundu, S. R., Panem, C. A., & Thimmapuram, A. (2020). Intelligence Using Automata-Based Nature's Digital Philosophy. SN Computer Science, 1(4), 1-6.[2020]
- [4] Automated Smart Metering; S Visalatchi; K Kamal Sandeep, "Smart energy metering and power theft control using Arduino & GSM", 2017 2nd International Conference for Convergence in Technology (I2CT), [2017]
- [5] Payman Dehghanian; Mladen Kezunovic; Gurunath Gurralla; Yufan Guan, "Security- based circuit breaker maintenance management", 2013 IEEE Power & Energy Society General Meeting, [2013].
- [6] Srinivasa Rao, G., Arur, P. C., & Lamani, M. R. Amalgamated cloud ai: transpiring revolution in broadband cellular network standards.[2021]
- [7] Vivek Kumar Jaiswal, Hritik Kumar Singh, Kuldeep Singh, "Arduino GSM based Power Theft Detection and Energy Metering System", pp. 1-5, Proceedings of the Fifth International Conference on Communication and Electronics Systems (ICCES 2020)
- [8] PrashantChoudhary, JitendraNathBera, "SMS Based Load Flow Monitoring and Analysis for Theft Location Detection in Rural Distribution Systems", pp. 1-5, Proceedings of 2020 IEEE Calcutta Conference (CALCON)
- [9] M J Jeffin, Madhu G M, AkshayataRao, Gurpreet Singh, C. Vyjayanthi, "Internet of Things Enabled Power Theft Detection and Smart Meter Monitoring System", pp. 1-6, International Conference on Communication and Signal Processing, July 28 - 30, 2020, India
- [10] Gundu, S. R., Arur, P. C., & Anuradha, T. (2019). Proposal of DPPM based IOT-Cloud convergent Monitoring system for focused seriation & tracing of 2019-nCoV.[2019]
- [11] Muhammad BadarShahid, Muhammad Osama Shahid, Hasan Tariq, "Design and Development of An Efficient PowerTheft Detection and Prevention System through Consumer Load Profiling", pp. 1-6, Proc. Of the first 1st International Conference on Electrical, Communication and Computer Engineering (ICECCE) 24-25 July 2019, Swat, Pakistan
- [12] Yang Xue, YifeiShu, Heng Yang, Sha Liu, YinghuiXu, "Electric Theft Behavior Detection Method Based on Power Customer Data Analysis", pp. 1-4, 2020 International Wireless Communications and Mobile Computing (IWCMC)
- [13] A Muruganandhan.D, Muthunagai.R, Rajkumar.S, Mohamed Vasif.J, "Remote Monitoring of Distribution Transformer with Power Theft Detection using PLC & amp; SCADA", pp. 1-4, 2020