



# International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

*(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)*



**Impact Factor: 8.699**

**Volume 14, Issue 7, July 2025**

# Electricity Theft Detection and Alert using Transmitter and Receiver with SMS

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**ABSTRACT:** Power theft is a big issue in developing countries. Stealing electricity is considered as a crime. Power theft in a country hits its GDP hard. So it is very important to prevent power theft for undisturbed supply of good quality power everywhere. This paper aims at designing and implementing a power theft detection system in customer and distribution side. Normally power theft is done by directly tapping power from the lines. This system helps in detecting the power theft and in locating the area in which power is stolen. With the help of sensors placed in respective regions power theft is identified and alert is sent to authorities. The ultimate goal is to prevent power theft and it helps in providing good quality power to legal users.

## I. INTRODUCTION

Electricity is one of the main requirements for sustainment of comforts of life. It should be used very judiciously for its proper utilization. Therefore it is an important issue to provide electricity to the consumers of different areas in the country with minimum amount of losses. Also the electricity will be provided to the consumers by an economical method and will be as cheap as possible. Sometime the consumers are not satisfied with the services of power companies. Most of the times, they have complaints regarding statistical errors in their monthly bills. Thus we are trying to present an idea towards the minimization of technical errors and to reduce human dependency at the same time. With the help of this project we are aiming to detect energy theft with the help of wireless communication.

In this way we can reduce the power hefting as we are living in country where electricity shortage is the biggest problem. It requires less human efforts because all the process is done automatically if any theft thing is detected. With the help of this project we can ensure error free communication and the system will only maintain by the authorized department in case of power theft. Our system is economical and with great effective result. Our system consists of two microcontroller, RF transmitter, RF receiver, Relay, Led lights and regulated power supply. This implementation is done in such a way that our system is interfaced with energy meter as well to the load line. Initially the sensor senses the meter pulses and line pulses. In normal condition if energy meter giving same result as load is consuming the RF transmitter transmits to RF receiver which is connected at substation which is interfaced with PC that everything is O.k. there is any tempering in meter or meter pulses are not matching with line pulses then power theft has been done then microcontroller guide the relay. RF transmitter sends information to substation that power being theft at House no etc.

The electricity theft is of two types. Consumers do not show that they are stealing electricity and they steal whenever no one seeing them. There is involvement of meter readers or line men who know about their corruption and they do not stop them and take some money to shut their mouth. So in both ways WAPDA is bearing losses. This is not only due to the nature of the people or WAPDA employees but also due to the system that we are using to calculate their electricity units or so called energy meter. These meters are so simple that everyone knows its operation and its drawbacks.

## II. MAIN FEATURES OF THE PROJECT

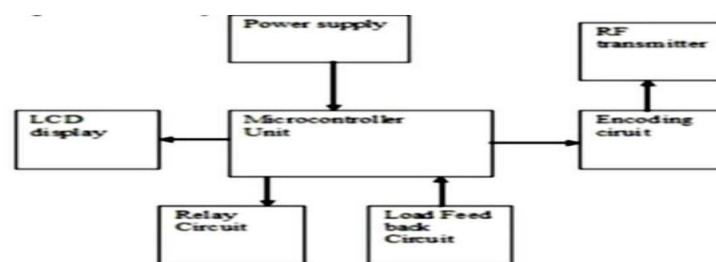
1. Our project will be capable of Sensing the power theft.
2. Real time power monitoring at house.
3. Transmitting the information over wireless, to substation.
4. In this system the tempering of energy meter will not possible.
5. In case of tempering the maintenance will only done by the authorized department.

## III. METHODOLOGY

1. Exposing meters to strong magnetic fields to wipe out the memory.
2. Inserting a film or depositing high viscous fluid to disturb the rotation of disc.
3. Implementation of sophisticated technologies like remote sensing devices.
4. Tampering the crystal frequency of integrated circuits.
5. Creating a link between the breaking control wires in an energy meter would divert the current reading in the meter reflecting zero reading at all times.
6. In the case of electronic meters, Radio Frequency (RF) devices are mounted to affect the accuracy of the meter.
7. A shunt is installed between the incoming and outgoing meter terminals.
8. Inter-changing the incoming and outgoing terminals of the meter.
9. Damaging the pressure coil of the meter.

## IV. THESIS

Losses that occur during generation can be technically defined, but T&D losses cannot be quantified completely from the sending-end information. Distribution losses in several countries have been reported to be over 30%. Substantial quantity of losses proves the involvement of Non-Technical Losses (NTL) in distribution. Total losses during T&D can be evaluated from the information like total load and the total energy. Billed, using established standards and formulae. In general, NTL are caused by the factors external to the power system. Electricity theft constitutes a major chunk of the NTL. Major forms of electricity theft include bypassing (illegal tapping of electricity from the feeder), tampering the energy meter, and physical methods to evade payment. Electricity theft can be defined as, using electricity from the utility without a contract or valid obligation to alter its measurement.



Block Diagram of Installed System

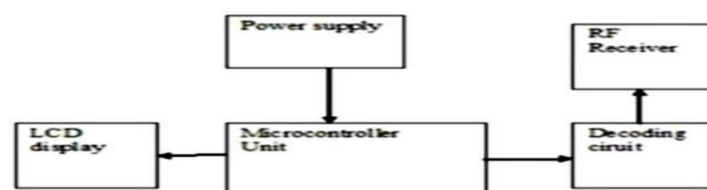


FIG 1: Block diagram of ELECTRICITY THEFT DETECTION AND ALERT USING TRANSMITTER AND RECIEVER WITH SMS



The main blocks of this project are:

ARDUINO MICROCONTROLLER  
CURRENT SENSOR.  
AC ADAPTOR  
LCD display.  
RF Transmitter (sending & receiving).  
BUZZER.  
RELAY.

### 1. CURRENT SENSOR

ACS712 Current Sensor Module - 20A can sense upto 20A of current flow. Sensing and controlling the current flow is a fundamental requirement in wide variety of applications, which includes over-current protection circuits, battery chargers, switching mode power supplies, digital watt meters, programmable current sources, etc.

ACS712 Current Sensor Module - 20A is based on ACS712 sensor, which can accurately detect AC or DC current. The maximum AC or DC that can be detected can reach 20A, and the present current signal can be read via analog I / O port of a microcontroller or an Arduino.

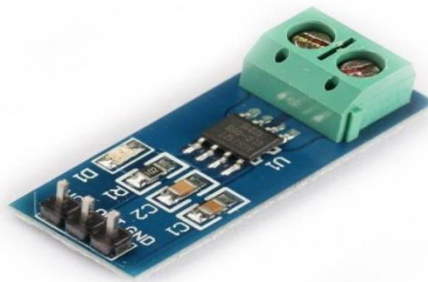


Image: Current Sensor

### 2. ARDUINO UNO

This Arduino Uno is an original microcontroller board from Arduino officials based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

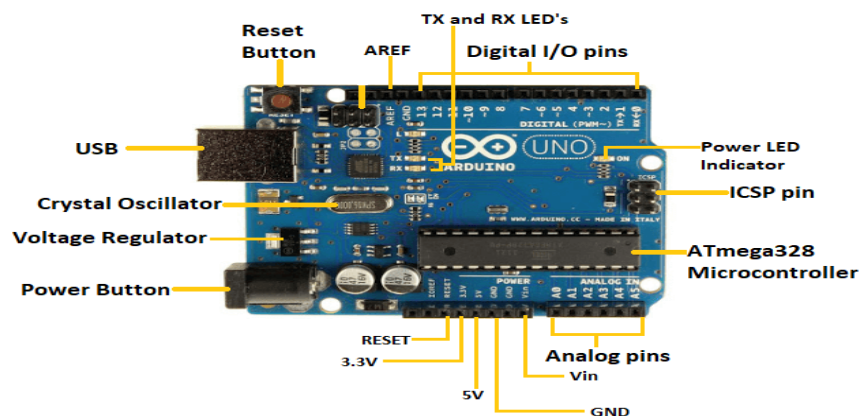


Fig: Arduino Uno

### 3. ARDUINO UNO EXPANSION SHIELD

Sensor Shield allows you to connect to various modules like sensors, servos, relays, buttons, potentiometers and many more directly to your Arduino through this Sensor Shield.

Each functional module has buckled port with VCC, GND, and Output, which has the corresponding port on the Sensor Shield; connected with a plain 2.54mm dual-female cable you may start playing already. Buckled brick cables are like cement for bricks, make the connections easier, secure and more professional looking.

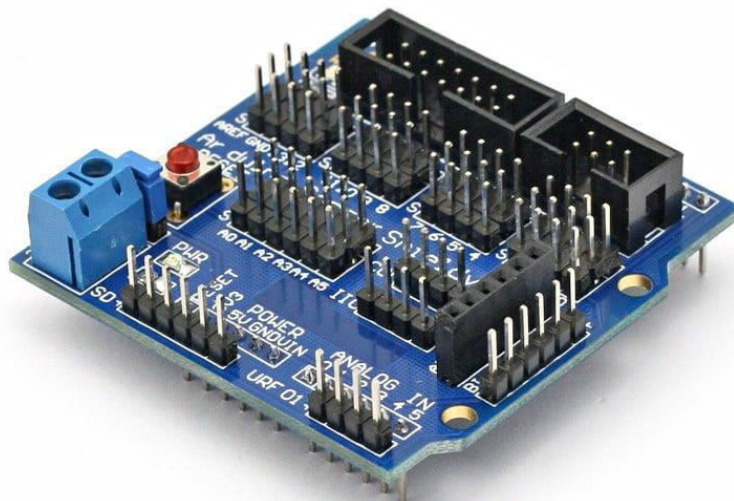


Fig: ARDUINO UNO EXPANSION SHIELD

### 4. LCD

To display our parameters, 16x2 LCD is used.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines.

Specification- LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs.

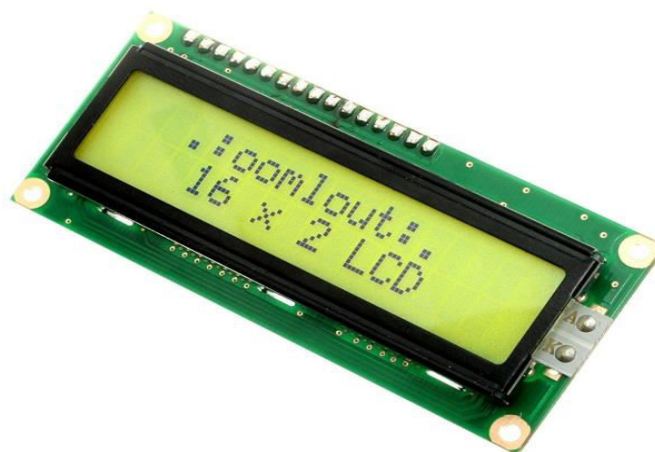


Fig: LED

## 5. RELAY

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

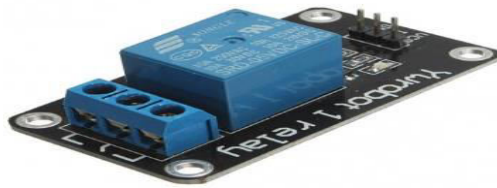


Fig: Relay

## 6. Adapter

This 12V 1A power supply is mainly used in, chargers, microcontroller, portable amplifiers, audio-video players, Bluetooth/wifi modules, DC motors, led light circuits. Despite being small in size these power supplies work effectively. The input voltage of this supply is 220VAC and output is 12V DC. This supply can provide upto 1A current.

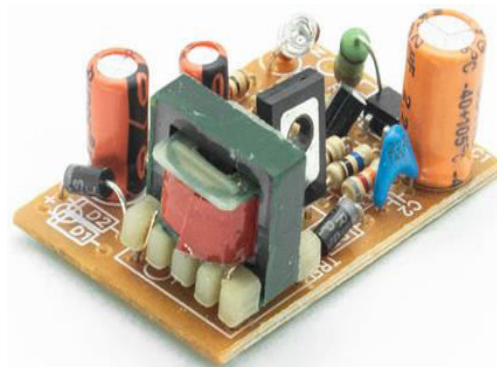


Fig: Adapter

## 7. RF TRANSMITTER RECEIVER WIRELESS MODULE

This hybrid RF Transceiver Module provides a complete RF transmitter and receiver module solution which can be used to transmit data at up to 3KHz from any standard CMOS/TTL source. The transmitter module is very simple to operate and offers low current consumption (typical. 11mA). Data can be supplied directly from a microprocessor or encoding device, thus keeping the component count down and ensuring a low hardware cost. The RX – ASK is an ASK Hybrid receiver module. The RF Transmitter Receiver Module is an effective low-cost solution for using 433 MHz. The TX-ASK is an ASK hybrid transmitter module. TX-ASK is designed by the saw resonator, with an effective low cost, small size and simple to use for designing.



Fig: RF TRANSMITTER RECEIVER WIRELESS MODULE

## 8. BUZZER

An Active Buzzer Alarm Module for Arduino is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. Just like what you are viewing now, it is 3.3V-5V DC Electronic Part Active Buzzer Module. Using top quality material, it is durable in use.

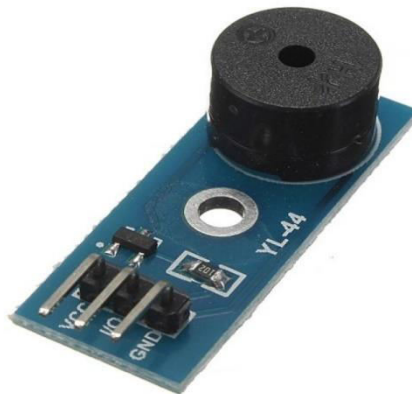


Fig: Buzzer

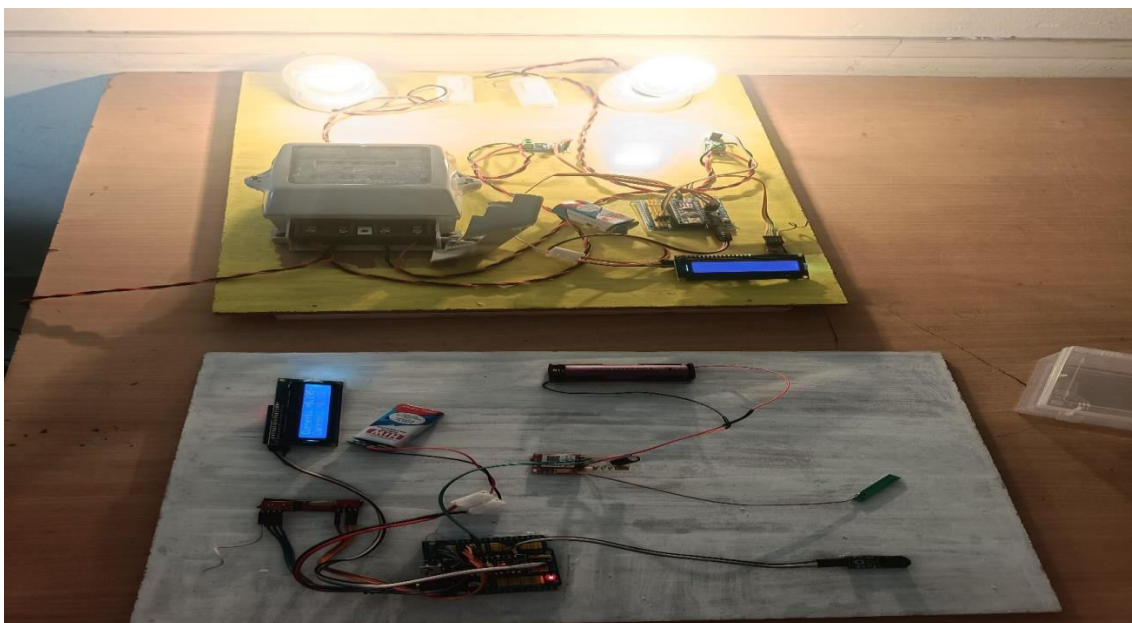


Fig. ELECTRICITY THEFT DETECTION AND ALERT USING TRANSMITTER AND RECIEVER WITH SMS



## V. CONCLUSION

There have been many electricity related theft and in this way we will bring it under control and also design the microcontroller based power theft identifier. The major motive of designing such system is that it will eventually and ultimately reduce the illegal use of electricity and will save a lot of money because it directly affects the economy of a nation as well as the consumer who suffers a lot of loss due to power theft. Thus this system will be beneficial to consumer as well as for government. The best thing about this project is that it will require only one time installation cost and can be used in future with ease without any future investments. Thus this project will be a great advantage and relief to all the consumers and the entire nation as a whole.

## VI. FUTURE SCOPE

It requires only one-time installation cost after installation this can be used with ease for lifetime which acts as a great advantage. This project can be implemented in industries and any such places which require a large amount of electricity which will ensure that no wastage or any related theft of electricity takes place. It will completely eliminate the power theft and will increase revenue for the Government and contribute to the betterment of the society. We can make this project more user friendly by introducing a GSM module and also by using other low cost components. Furthermore, we can also modify the project in many ways like we can introduce a concept of IOT through which the customer will be notified if any unwanted interruptions or threat is sensed in their electric meter which will give a sense of control to the customers. Also we can enhance the system in a way such that it will keep the track of the time about when the theft of electricity took place and will also indicate the amount of electricity that was lost due to theft. It will also identify the medium and mode through which loss of electricity took place.

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