

## ELECTRICITY THEFT DETECTION USING RF

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### ABSTRACT:

Electricity theft is at the center of focus all over the world but electricity theft in India has a significant effect on the Indian economy, as this figure is considerably high.

In this project we will use wireless technology to monitor theft in electricity meter. An electric meter is a device used for measuring the amount of electrical energy supplied to a residential or commercial building. Due to increase in cost of electricity, tampering and security in electric meters has become a major concern for government agencies.

We will use radio technology to monitor wirelessly meter reading. If there will be difference in wireless reading and installed meter reading then we can easily detect theft.

LCD screen will display the unit consumption. It will also display the balance amount every time.

**KEYWORDS:** Electricity Theft, Monitoring System, Transmitter module, Receiver module.

### INTRODUCTION:

Wireless electricity theft detection system using Radio frequency technology presents an efficient and less costly way to adulterate the wireless technique used in this research paper. This wireless system is used to overcome the theft of electricity via bypassing the energy meter and hence it also controls the revenue losses and utility of the electricity authorized agency. There is always a contract between the consumer and the supplier that the consumer will pay for the electricity consumed by him. But in India near about 32 % of the electricity is consumed but not paid for it i.e. it is being stolen by the consumer hence the need of a system arises that would overcome this theft of electricity but mostly the electricity is being stolen via bypassing the energy meter hence this system recognizes such type of theft of electricity. Mainly this system consists of microcontroller, energy meter and RF module to check for the theft of electricity and then to send a message to the authorized agency which looks after the electricity consumed. The wireless technique used in this system provides the major advantages such as low power consumption and also the low cost of the RF module.

The theft of the electricity is the major concern of the transmission and distribution losses in the supply of the electricity worldwide. Mainly the electricity is being stolen via bypassing the energy meter therefore this wireless system is utilizes to overcome this type of the theft of the electricity and is very beneficial for the authorized agency to control its revenue loss as all of us know that the cost of fuel is increasing day by day hence the intensity of stealing the electricity and using it as a substitute is also increasing therefore it is needed much to design a system that can detect the theft of the electricity. There are two types of techniques to deliver the information to the authorized agency to control the theft of the electricity via bypassing the energy meter.

There are many factors that encourage people to steal electricity. Of which socio- economic factors influence people to a great extent in stealing electricity. A common notion in many

people is that, it is dishonest to steal something from their neighbor but not from the state or public owned utility company. In addition, other factors that influence illegal consumers are: Higher energy prices deject consumers from buying electricity. In light of this, rich and highly educated communities also steal electricity to escape from huge utility bills.

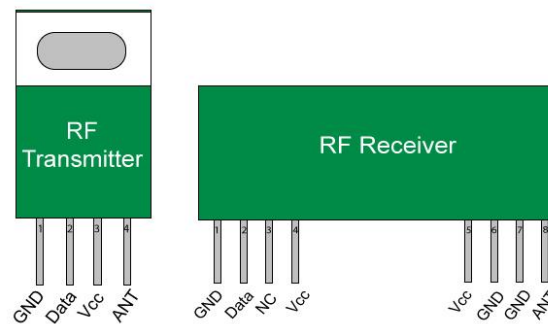
### Methods of theft:

Methods used to commit theft fall into the Following broad categories: A. Connection of supply without a meter.

B. Bypassing the meter with a cable

C. Interfering with the meter to slow or stop the disc, including use of electrical devices which stop the meter or cause it to reverse (so-called 'black boxes'). Negative effects of electricity theft are severe and dangerous.

### RF TRANSMITTER AND RECEIVER MODULE:



**Fig 1: RF module circuitry**

The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK).

Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources.

This **RF module** comprises of an **RF Transmitter** and an **RF Receiver**. The transmitter/receiver (Tx/Rx) pair operates at a frequency of **434 MHz**. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps.

The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter.

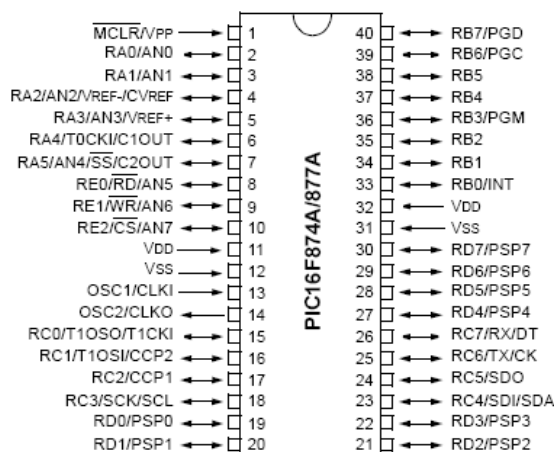


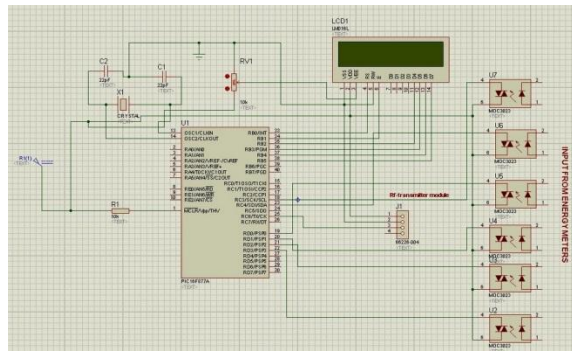
Fig 2: PIN description of microcontroller PIC16F877A

Pin No	Function	Name
1	Ground (0V)	Ground
2	Serial data input pin	Data
3	Supply voltage; 5V	Vcc
4	Antenna output pin	ANT

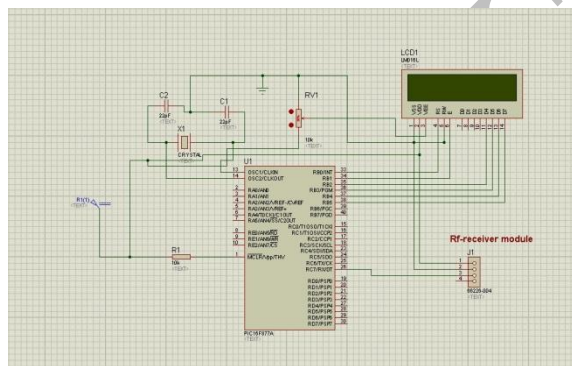
Fig 3: PIN description of RF Transmitter

Pin No	Function	Name
1	Ground (0V)	Ground
2	Serial data output pin	Data
3	Linear output pin; not connected	NC
4	Supply voltage; 5V	Vcc
5	Supply voltage; 5V	Vcc
6	Ground (0V)	Ground
7	Ground (0V)	Ground
8	Antenna input pin	ANT

Fig 4: PIN description of RF receiver



**Fig 4: overall circuit diagram**



#### APPLICATIONS:

- Vehicle monitoring , Remote control, Telemetry,
- Small-range wireless network, Wireless meter reading
- Access control systems, Wireless home security systems.

#### CONCLUSION:

Electricity theft, a common form of commercial losses, involves tampering with meters to distort the billing information or direct connections to the power system. Commercial losses are nearly impossible to measure using traditional power system analysis tools. This is due to the lack of information on both commercial and the legitimate loads in the system, which translates to insufficient inputs for any meaningful loss calculations. Despite the best efforts by utilities, the current results of commercial losses measurements are often inaccurate at best, because the figures rely heavily on the records of detected cases, rather than by actual measurement of the electrical power system.

#### REFERENCES:

1. NOVA , “Kings of Camouflage”, Anatomy of a Cuttlefish (non-Flash). PBS. September, 2013.
2. Robert L. Boylestad, Louis Nashelsky: “Electronic Devices and Circuit Theory”; Pearson Education.
3. Haakon Skar, “Atmel - Electronic products”, Hearst, November 1, 2011.
4. T. B. Smith, “Electricity Theft: a Comparative Analysis”, Energy Policy, Volume 32, Issue 18, December 2008; 2003, pp. 2067 – 2076.
5. A Amoah, Guide to Electric Power in Ghana, First Edition, Resource Centre for Energy Economics and Regulation, Legon; 2005, 89 pp.8