



# AUTOMATIC COMMUNICATION SYSTEM FOR ELECTRICITY METER READING

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**Abstract:** Energy meter reading is a laborious and an expensive affair. In conventional system the meter reader has to go and take the reading manually to issue the bill, which will later be entered in the software to automate the billing and payment system. To reduce the tedious task and financial wastage, the manual meter reading process and the bill data entry process can be automated. This Project utilizes a new network communication system for energy meter reading by integrating communication technology and software system along with the existing meters. A wireless communication system will be integrated with electronic energy meter to have remote access over the usage of electricity. Even though they are two different modules, energy meter deliver the reading details as on when it demands by the communication system. The communication system is further connected with electricity regional/sub-regional office, which will rather act as a base station. Instead of creating a separate communication system and backbone, any of the secure existing communication service infrastructures may also be utilized to avoid any initial investments. In this system a prepaid energy meter is installed in the house, which enables the system to communicate with the user through notification. The communication channel is identified by the consumer's number and it is secured by any cryptographic standards. Base office can verify the energy meters performance by checking the day to day consumption of energy. This will also help to avoid any tampering or break down of energy meter. In this Project, we propose to use ESP 32 to control the system with the software programming in Embedded C, integrated to the Power Meter module.

## I. INTRODUCTION

Despite surviving thousands of years without electricity before, we have come to depend on it to complete our everyday tasks and have built our lives around it. We are so reliant on electrical power that it would be a shock to many if you no longer had the regular supply. Now a day energy meter reader goes to every premise and takes the reading manually then issues the bill. In manually reading human error possible and not provide reliable meter reading. An energy meter is a device which is used to measure the consumption of energy of any residence or other industrial establishment. In Conventional metering system to measure electricity consumption the energy provider company hire persons who visit each house and record the meter reading manually. This is only a sluggish and laborious. In Conventionally metering system people try to manipulate meter reading by adopting various corrupt practices such as current reversal or partial earth fault condition, bypass meter, magnetic interference etc. If any consumer did not pay the bill, the electricity worker needs to go to their houses to disconnect the power supply. This project aims to reduce the labour and modify the conventional electricity meter reading practices. This is a metering system that is to be used for data collecting from the meter and processing the collected data for billing and other decision purposes.

## II. LITERATURE SURVEY

Automatic Meter Reading of Electricity by using Power line Communication- Rahul S Puhkala, Sunil V Bavache, Poonam Borle, Santhosh N Kashid proposed that Power is the soul of world which is relevant to the electricity and "ELECTRICITY" is the word which now rules the world. So, proper utilization of this commodity is of immense important to us. Hence, it is required to measure power consumption. Conventional system requires an individual and agent to physically come and take down the readings and report to house hold or office the amount one has to pay. The aim of this project is to measure and monitor the electricity consumed by consumers in a locality and transmitting the measured reading between the consumer and utility.

Wireless Communication System for Energy Meter Readings- Cindy M Goral, Kenneth E Torrance, Donald P Greenberg and Bennet Battalia proposed that a new network communication system for energy meter reading by integrating communication technology and software system along with the existing meters. A wireless or wired communication system will be integrated with electronic energy meter to have remote access over the usage of electricity. Even though they are two different modules,

energy meter delivers the reading details as on when it demands by the communication system. The communication system is further connected with electricity regional/sub-regional office, which will rather act as a base station.

Smart Meter of Electricity- Kushal Babu, Sainath Meharkar proposed that as population rises the demand of electricity also increases and energy theft becomes a major issue in countries like India. A large loss is faced by the utility of electricity every year due to power theft. The automatic meter reading (AMR) system already exists but with potentially reduced reliability and risk of loss of privacy. To collect consumption, diagnostic and status data by visiting consumers' places every time is tedious work. In this paper, an attempt is made based on a microcontroller ESP32 for monitoring, detecting and controlling energy theft remotely. The Internet is used for communication to the central utility system. The consumer will be motivated to use electrical appliances effectively by sharing the real time usage with it.

Design of an Automatic Meter Reading System-Shi Wei Lee, Kou Tan Wu proposed that the meter reading and management processes are free from human involvement. Based on the existing telephone networks, it is very flexible for utility companies to access, service and maintain this meter reading system. A user friendly and window-based user interface is designed which fully utilizes the personal computers terminate and stay resident programming techniques to achieve communications between the remote meter reading units and the personal computers in the electric utility control centre. This paper describes the hardware design of the remote reading unit and the software implementation of the communication module and user interface. A microprocessor-based automatic electricity meter reading system is implemented, which provides cost-effective, reliable and interference free data transfer between remote meter reading units and the electric utility control centre.

GSM Based Smart Energy Meter with Arduino Uno- Fatima bt Morad, Siti Asma, Win Adyansha Indira proposed and demonstrated that the Smart Energy Meter that the users will be able to monitor their current power consumptions (bill) anytime from anywhere by using their mobile phone via Short Message Services (SMS). It would be a huge beneficial for the customers if they can monitor their energy meter's power consumptions (bill) on a real-time basis. Arduino UNO, main controller, was the interface between energy meter and Global System for Mobile communication (GSM) module. GSM modules connect the energy meter to users' mobile phone.

### III.OBJECTIVE

Main objectives of this work can be illustrated as:

- To automate the meter reading process and bill data entry process.
- To save the time.
- To reduce the labor.
- To reduce the financial wastage.
- To provide customers with detailed information about their energy usage at different times of the day, this in turn enables customers to manage their energy use more proactively.
- To enable prepaid billing system

### IV. METHODOLOGY

After studying the various research papers of Electricity meter reading we have concluded that there are certain limitations in conventional electricity meter which can be worked upon. Manual collection of consumption data from energy meters is usually prone to human error and is time consuming. Manually processing the bill may also results in errors. If the manual meter reading and bill data entry process can be automated then it would reduce the laborious task and financial wastage. With a smart meter, all that data is sent to your supplier automatically, providing them with accurate readings, so you can say goodbye to estimated bills. The system also enables the automatic disconnection of power supply when the consumer fails to pay the electricity bill in time similar to mobile bills. Once the bill is payed automatically the power supply is resumed. Thus eliminating the need of electricity worker to visit houses to disconnect the power supply.

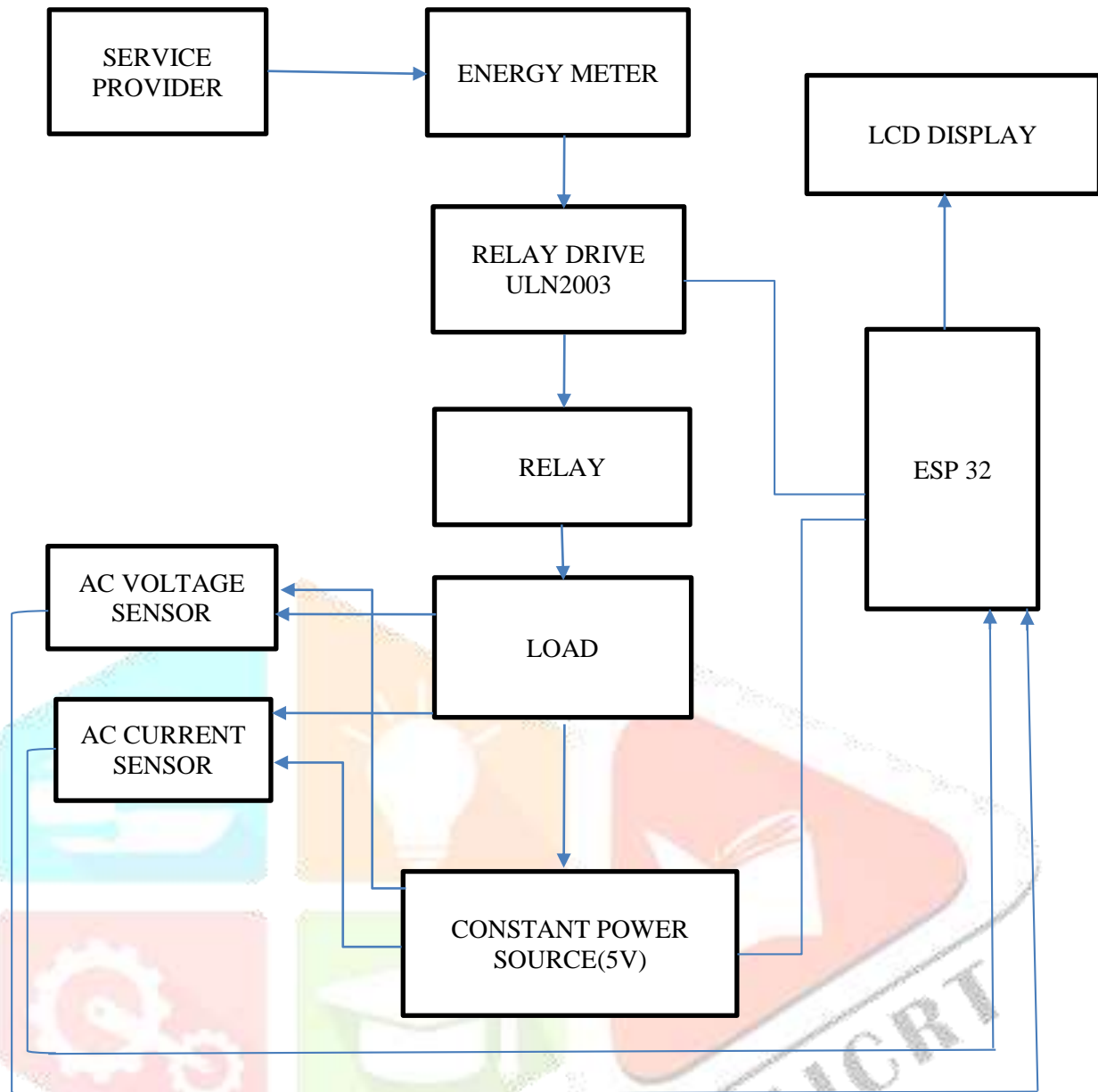


Figure 1: Block Diagram

## V. WORKING

The proposed system deals with a wireless electricity meter reading transmitter with ESP 32 microcontroller, Energy meter and a relay unit. It can explore new possibilities for the next generation Automatic Meter Reading whose goal is to help collect the meter measurement automatically and possibly send commands to the meters. In this system power supply is provided to meter. Transmission of usage details is send to office modem using user modem. Every consumer has unique number provided by corresponding authority. A relay is connected to the energy meter. The wifi module incorporated in the ESP 32 microcontroller will send the information to the regional office using IOT technology. For reading the data from the metering IC, ESP32 microcontroller is programmed using software interfacing. When microcontroller reads the energy usage, this data is stored and updated in software. In this, meter is measured for 1 unit of energy consumption and it creates 3000 pulses in LED. This pulse is measured and transmitted to the ESP 32 micro controller. A LCD module is used to displays the current usage and units consumed. After usage of each unit the amount and total units will be incremented. We can recharge the meter to a particular prepaid amount. The relay incorporated in the system enables the automatic disconnection of power supply when the consumers fail to pay the electricity bill in time similar to mobile bills. Once the bill is payed automatically the power supply is resumed.

## VI. BENEFITS & LIMITATIONS

Advantages:

1. System helps to maintain the data properly.
2. This system is very accurate, simple and low power consumption.
3. Which is used for the real time applications.
4. Provider side is easy to manipulate for bill generation and other such task.
5. Positive impact on the environment.
6. Can highlight faulty appliances or potential safety issues.

Disadvantages:

1. Older smart meters become “dumb” once you switch.
2. In-Home Display may be inaccurate.
3. Poor signal
4. A smart meter will not reduce bills alone.

## VII. APPLICATION

- Automatically collecting consumption, diagnostic,
- Status data from water meter or energy metering devices (gas, electric) and transferring that data to a central database for billing, troubleshooting, and analysing.

## VIII. FUTURE SCOPE

Though many have tried implementing a country wide Automatic Meter Reading System, it is still an unreachable goal, many factors like cost, feasibility and mainly the need to replace the existing system have hindered its development. At least in near future, the cost involved in the building of this system could be minimized by using more efficient technology and commercializing it by production in a large scale thus reducing the production costs tremendously and hence making it more feasible to be implemented worldwide. The system could be made more smart by allowing the user to check for the power consumption and alert him on his power consumption and also allows him to turn off the various devices from his mobile application itself hence conserving energy and saving money. Moreover if real time data feeds of the energy usage were tracked and stored in a centralized data centre it will enable the government or the energy provider to predict the energy demand trends consequently ensuring uninterrupted supply of electricity and reducing the unexpected load on the electricity grid making it more tolerant to failures.

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