

# Energy Meter Monitoring Over IoT

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**Abstract** — With the advancing technology, every field is shifting towards making systems automated, portable and easy to use. Supporting the change in time, the project proposes a technique for real time monitoring of energy consumption using smart energy meters connected with each other in a smart network and for theft analysis using IOT. Here we present ingenious energy theft detection with the boon of predicting consumer's ungenerous consumption pattern. To bring awareness among the people, we alert the consumers by a notification. IOT operation is performed by Wi-Fi device, which sends the meter data to the web page through the IP address. This is used for electricity distribution department to continuously monitor the consumption of power and billing information that is calculated using microcontroller.

## I. INTRODUCTION

In this era of energy crisis, energy management and monitoring which helps in effectively controlling of energy and avoiding energy wastage. Proper utilization of power is of immense important, as it is the soul of world, which is Electricity. The data collection of energy consumed by the consumer and monitoring of the distribution of energy are very necessary need in the energy visualization and analysis. The authorized person from the electricity distribution department was being preceded by human operators at consumer's service location to note down the consumed energy units and calculates the usage charge. In this current scenario, many crises arise. There are various reasons for these crises.

The problems which are firstly may be due to observational error, i.e., even a single digit change while noting down the energy consumed readings may totally changes the calculation of the cost for the consumed units and also there will a delay in taking the meter reading by the authority of electricity distribution department due to bad weather conditions, shortage of authority persons. Next due to a case where there is a absences of consumer in the home which leads to a problem that the consumer will not be aware that the reading was taken and some difficulties for the authority persons. This process of traditional meter reading which is time consuming and increase in the labour expenses. Therefore, to reduce the effort of EB, new technology can be incorporated (i.e.), the IOT based real time monitoring of energy.

## II. ACKNOWLEDGMENT

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## III. HARDWARE

### ARDUINO UNO

It is an open-source hardware and software user community that will design and manufacture single-board microcontrollers, and kits for building digital devices. Arduino UNO board was designed using microprocessors and controllers. the boards are supplemented with set of digital and analog input/output (I/O) pins that maybe interfaced with expansion boards or breadboards and other circuits.

## POTENTIAL TRANSFORMER

Voltage transformers are parallel-connected types of instrument transformers. They are a plot to present a trifling load to the supply being measured and have an exact voltage ratio and phase connection to qualify exact secondary connected metering.

## CURRENT TRANSFORMER

Used to reduce or multiply an alternating current. It constructs a current in its secondary which is comparable to the current in its prime.

Mainly used to measure the current of another circuit. It lowers the current signals for measurement purposes.

## ESP8266 WIFI

It is a SOC with a consolidated TCP/IP protocol stack that can give any access to the Wi-Fi network. The ESP8266 is capable of either providing an application or dumping all WI-FI networking functions from other application processors.

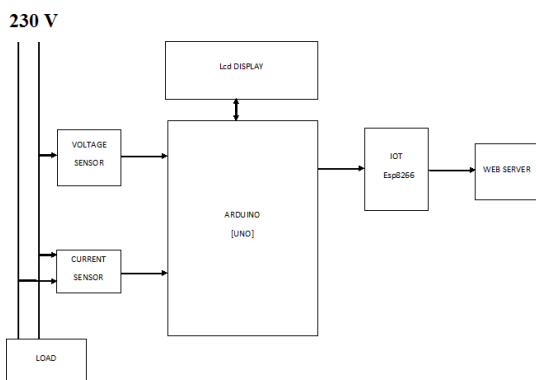


Fig 1 Hardware block diagram

## IV. EXISTING SYSTEM

In the long-established billing system, a person from the electricity distribution department has to refer each chamber and take the scan from each chamber's meter which is laborious and also needs a lot of hands and staffing. As in our state, the electricity energy billing period is at edge of two months. Thus, during the middle of the month, the end-user is not having the cognizance of how much the potential is devour, they can only know at the end of one or two months when the bill is furnished. Where the end-user cannot trace the consumption of the power in the agreeing. One more drawback of this organization is larceny and such practices which is one of the most common causes of power exigency.

## V. PROPOSED SYSTEM

In the proposed system to eliminate the manual work and the human involvement in the meter reading, we are using the concept of the This technique makes it feasible for electricity distribution department to organize unit readings without operating manual involvement. The data, and the unit finished by the client which is collected at the client premises

is loaded to the individual electricity distribution department official web server. A database at the server, that hoards all the segments including the client number, and units depleted which will be only unrestricted to the quotation. This is achieved by fusing the Arduino microcontroller with an energy meter. The android application can scrutinize the power usage and can warn the users when power usage is reaching close to the stipulated anteroom energy level and forewarns the consumer by a message if it overreaches. The major benefit is that the power larceny is detected with the client's number, which will be comfortable for the electricity distribution department officials to take instantaneous actions against the client. If the power larceny is identified in a locality the server automatically detaches the illicit affinity without mortal involvement.

## VI. DATA FLOW DIAGRAM

The strategy for conceiving a unique technique or superseding an elder one is known as system design. Simply said, system design is analogous to a building blueprint in that it delineates all of the segments that will be included in the final result. The stage of system design arrives after the stage of system investigation. Design entails specifying functions, data flow between those positions, preserving footpath of design determinations, and creating blueprints for the commission stage.

The connection between system investigation and system enactment is designed. The pursuing are some of the most important substance aspects to believe while designing application software:

- o Abstraction
- o Modularity
- o Verification

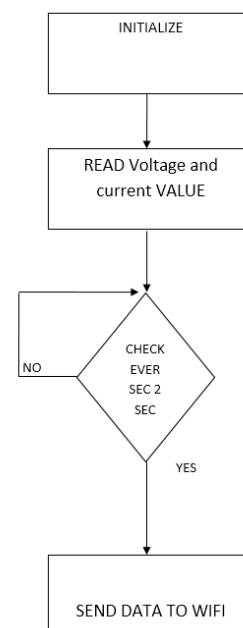


Fig 2 Transmission data flow diagram

A data outpour graph is a illustrated mechanism for depicting and interpreting data gesture inside a method. These are the major mechanism and the footing for the development of the other components.

The analytical metamorphosis of data from intake to result, as well as the processing of data, can be illustrated unassisted of the biological components that make up the strategy. The rational data flow diagrams are what they're called. The actual tools and data conditioning between individuals, departments, and workstations are depicted in the physical data flow diagrams.

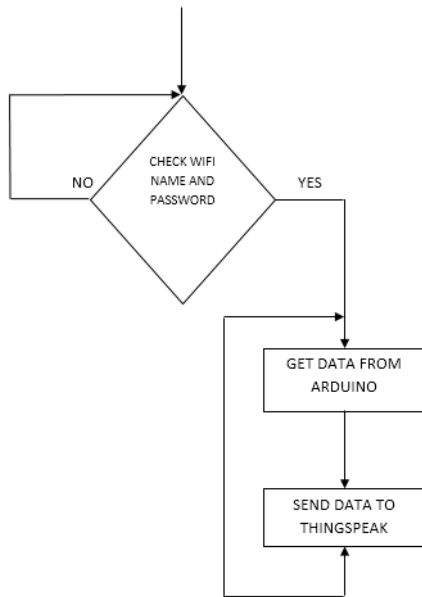


Fig 3 Receiver data flow diagram

### VII. TESTING METHODOLOGY

System testing is the podium introductory to system implementation during which the system is assembled error free and any crucial transformations are made. The system was tested with difficulty data, and appropriate system corrections were made. The user reanalysed and endorsed all of the information. The system was extremely user-friendly, with online usefulness unrestricted whenever required.

### VIII. LITRATURE SURVEY

The literature review of this project report is a section showing the various analyses and developments performed in the area of interest, taking into account various project parameters and project scope, and already published results. This is the most important part of this report as it gives direction in this development area. It helps to set goals for the analysis and provide a description of the problem.

### IX. IMPLEMENTATION

- Step 1: Install Blynk app to the device. (Which is available in play store)
- Step 2: Connect to the WI-FI and turn on the hotspot
- Step 3: Then login to the app using IoT mail id and password.
- Step 4: The home screen of the app will appear.
- Step 5: Now turn ON your hardware and it will connect automatically using WI – FI module.

Step 6: Then, it will show the reading which is also available in Arduino LCD display

### X. CONCLUSION

An endeavour encloses been made to make a realistic benchmark of “IoT Based Smart Energy Meter” The bred model is used to estimate the energy consumption of the household, and even make the fuel unit reading to be convenient. Consequently, it facilitates the wastage of energy and fetches cognition among all. Invariant will subtract the manual intervention.

### XI. FUTURE CHANGES

The main pursuit of the undertaking is to furnish the prevailing infrastructure for the energy meter that is currently employed in the smart municipality conception. The key advancement for the fortune will be energy meter readings, tampering detection approaches, association and disconnection, as well as furnishing pre-information to clients, all of which will take establishment over Wi-Fi internet.

We'll arrange up some Wi-Fi hotspots in apiece surroundings, through which all of the energy meters will be connected, and we'll designate up 4 to 5 parameters that will be monitored. And the indisputable refinement announcement will be nourished to the energy meter, assembling it more comfortable for electricity department to manipulate the circumstances. Also, in the eternity, we may employ some familiar apps or technologies to construct career more manageable for electricity department workers by reading meter readings snappy than the swiftest strategy. And, in comparison to the current system, attaching and detaching all meters on expenditure and non-payment intention stand instantaneous.

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