



# Based on IoT Prepaid Energy Meter with Theft Detection

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**Abstract**— Effective energy application impacts on the ultramodern period, so need to monitoring and controlling energy consumption is needed. Old academy cadence has numerous problems regarding with these effects. Internet of effects (IOT) is inter communication of bedded bias using networking technologies. IOT going to be important trend in future which affect the business, networking and also communication. In this paper, proposing a IOT grounded reimbursed energy cadence. utmost of the energy measures are designed to bill as per the units of energy consumed. These measures need to be manually read by people in order to give yearly/ daily bills. We then propose a IOT grounded smart electricity cadence. The system is designed to allow quantum of energy to be used as long as the account has balance pending. It also allows the driver to recharge the stoner account using IOT. The system first accepts account recharge and allows to use only limited units of energy as per recharge and also cuts off the force. The prepaid electricity billing cadence could be extensively used to give a new more tailored electricity billing system, where druggies may recharge when they intend to use that installation. It also consists of a ESP8266 module that allows the driver to recharge the cadence ever using dispatch communication service. This puts forward an innovative electricity billing and “ use as demanded ” electricity operation scheme.

**Keywords**— IoT, ESP 8266, Prepaid energy meter, Anti theft

## I. INTRODUCTION

The Internet of Things (IOT) the Internet of effects (IOT) is inter communication of bedded bias using networking technologies. IOT is going to be important trends in the future, affect the business, communication and networking. In this paper, proposing a IOT grounded reimbursed energy cadence. the utmost of the energy measures are designed to bill as per the units of energy consumed. These measures need to be manually read by people in order to give yearly/ daily bills. We then propose an IOT grounded smart electricity cadence. The system is designed to allow quantum of energy to be used as long as the account has balance pending. It also allows the driver to recharge the stoner account using IOT. The system first accepts account recharge and allows to use only limited units of energy as per recharge and also cuts off the force.

The prepaid electricity billing cadence could be extensively used to give a new more tailored electricity billing system, where druggies may recharge when they intend to use that installation. It also consists of a ESP8266 module that allows the driver to recharge the cadence ever using dispatch communication service. This puts forward an innovative electricity billing and “ use as demanded ” electricity operation scheme. It also eliminates the need for homemade electricity cadence reading tasks. These cadence are digital cadence with short circuit protection, Over voltage protection, Anti-Theft discovery.

## II. PROPOSED SYSTEM

The complete illustration for IOT grounded energy Meter is shown below. Although it's veritably simple, you should follow the graphical representation for a better understanding and make sure the connections are correct. Be advised that working with mains requires practice and hence don't make this circuit if you aren't sure how to do it. We've used NodeMCU with ACS712 Current Sensor, the current detector will measure the current consumed by our AC cargo and the NodeMCU will measure this current, calculate the power( assuming the Voltage is constant) and give it to the power value to A shadows like Adafruit IO.

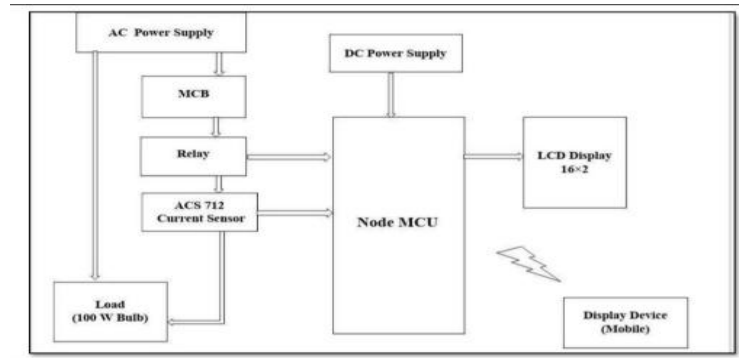


Fig. 1: Functional Block Diagram

The functional unit of the system is discussed below.

- Wi-Fi module: - ESP 8266 used here which can be used as a programmable module. As the module doesn't have a separate USB port, we need to use an external USB to Serial Adapter such as our FT232R Serial to UART Board to develop code using this module.
- LCD Display: - 16x2 LCD display used in the project.
- Current Sensor: - ACS712 current sensor can give precise current measurement for both AC and DC signals in the circuit. These are the sensors for metering and measuring overall power consumption of the systems. In this project it is used to measure power Theft.
- Driver: - A relay driver is used as gate or switch the load connected to the system
- Load: - A 100W bulb is connected as loads to the given system.
- Power supply: - A 230V ac power supply is given to the system. Wi-Fi module power is supplied by 5 V DC through voltage regulator.

### III.PRACTICAL IMPLEMENTATION

To analyse the prepaid energy meter monitoring system, the system is practically implemented. The detailed practical implementations are given below: Initial stage, the system isn't connected to the main supply i.e the system is in OFF condition. Fig. 2 represents the hardware implementation without connecting the system to the main supply. After checking all the hardware connections, supply is given to the hardware system. Fig .3 shows that the system is in ON condition. As soon as the Wi-Fi module is connected to the server, the system works perfectly according to design.



Fig.2 : System is in OFF condition



Fig.3 : System is in ON condition

Theft detected successfully in the system . As we connected extra load to the system (to detect theft ) , data sent to the server and detected the theft which again showed on the meter screen.



Fig. 4 : Theft Detected notification on screen

IV.RESULTS AND DISCUSSION

When power is given to the controller and controller takes the readings from the meter and sends SMS to the user after every month. The accuracy of Smart Energy Meter is checked by comparing the readings that are displayed on the LCD and that are received by SMS. Smart Energy Meter is also checked by connecting and disconnecting the customer’s connection. We connected different loads 100W, 200W, and 1000W and checked its performance.

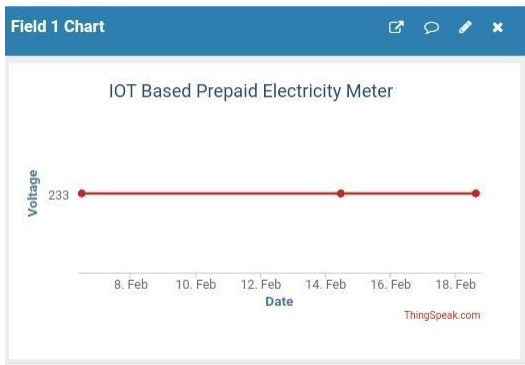


Fig. 5 : Voltage graph

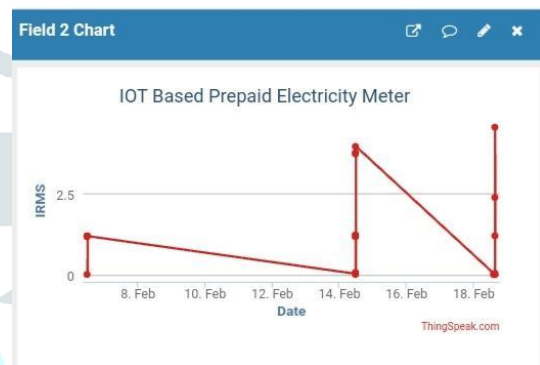


Fig. 6 : Current graph

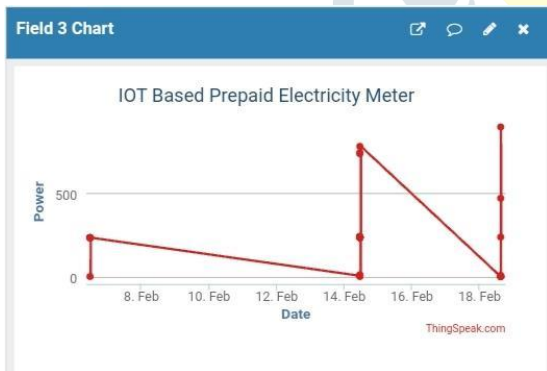


Fig. 7 : Power consumption graph

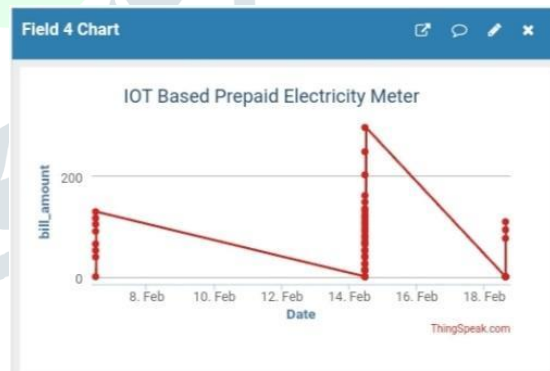


Fig. 8 : Bill amount graph

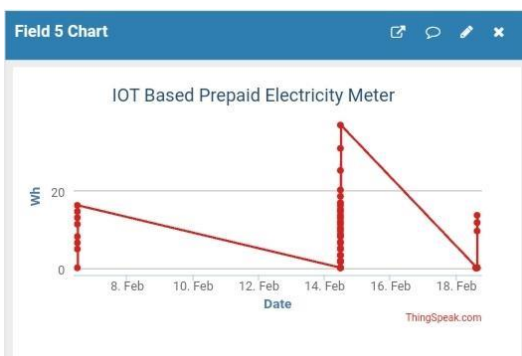


Fig. 9 : Power/hour graph

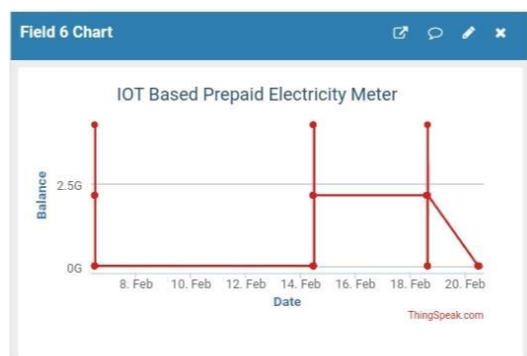


Fig. 10 : Balance graph

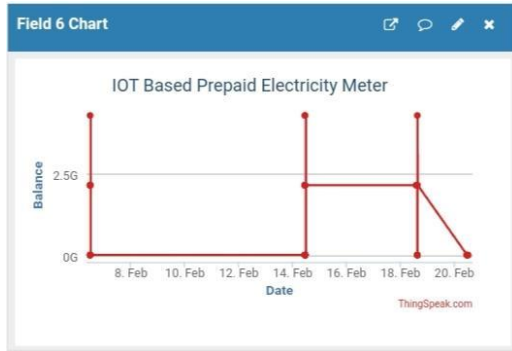


Fig. 11 : Balance

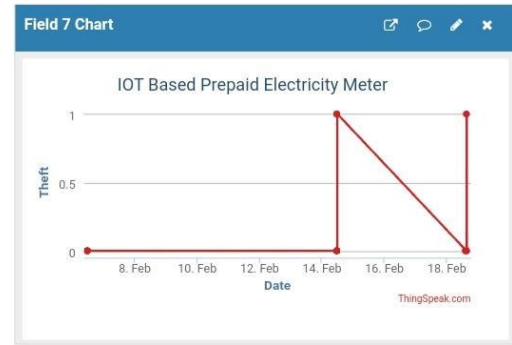


Fig.12 : Theft Detection

## V.CONCLUSION

Smart energy cadence with reading suggestions has been developed with IoT. Which is more useful to consumers for billing and maintaining lower bill payment and it decreases the mortal requirements for paying and other issues related to billing. We can extend this design for artificial purposes by uniting 3 phase measures but the circuit should be modified for getting accurate voltage to the regulator. Also the Theft Discovery system works impeccably.

The IoT can be implemented in various technologies such as home automation, automatic water level detector and traffic control system etc.

## VI. REFERENCES

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