

## IOT BASED GRID CUT OFF SYSTEM FOR NON-BILL PAID CONSUMERS

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### ABSTRACT

Automation is currently a very attractive topic for discussion due to the growth of the Internet. The creation of an embedded network-based automation system for residential electricity cut-off is covered in this study. Nowadays, everyone discusses the electricity-related issues the government is currently facing. This makes the need to create an automated system for a domestic electrical device an extrinsic motive. The system comprises of an embedded device that updates the data in the data centre and controls the primary switch for the power supply. Users receive cut-off warning messages via GSM and short message services. As the device might automatically cut off electricity when the usage limit is surpassed, it aids the electricity supplier in lowering operational costs. When MSEB officials visit a particular site to disconnect the supply, some consumers try to get around the connections of the metre, and others try to resolve the situation by offering bribes. In some areas, consumers are non-bill paid consumers who intentionally do not pay their bills. Hence, by making money and paying the bill on time, this project benefits the government.

### I. INTRODUCTION

At present, along with the development of the Internet, automation has become a very interesting theme to debate. This project discusses the development of an automation system for residential electricity cut-off using a network-based embedded controller. Nowadays everyone talks about the problem faced by the government regarding electricity. Based on this situation, becomes an extrinsic motivation to develop an automated system for residential electricity devices. The system consists of an embedded device to control the power supply main switch and update the data in the data center. A cut-off warning message is sent to users via GSM and short message services. The system helps the electricity provider to reduce the operation cost as the system could cut off electricity automatically when the usage limit is exceeded. In some areas consumers are non-bill paid consumers who intentionally do not pay bills and when the MSEB officials visit the particular site for disconnecting the supply some consumers try to bypass the connections of the meter and also some consumers try to settle the matter by giving bribes ultimately it regards to electricity power theft. Therefore this project helps the government by gaining profit by receiving the bill on time.

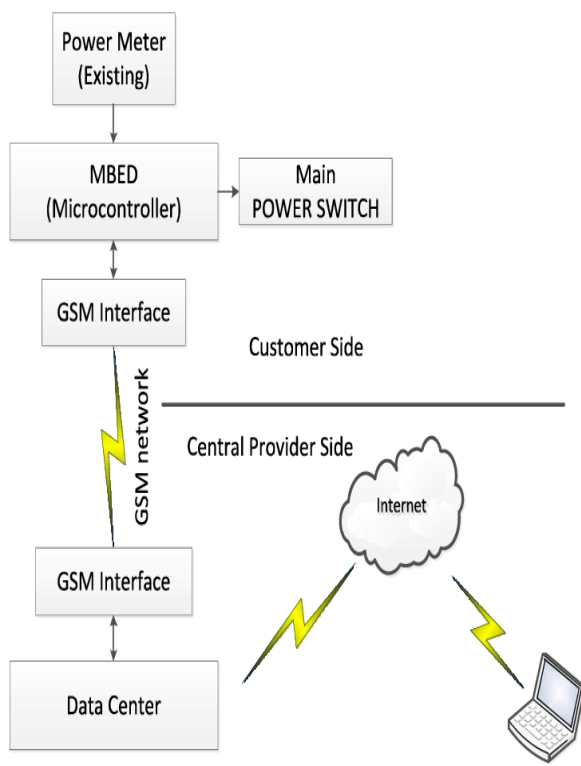
Utilities in electricity systems are destroying the amount of revenue each year due to energy power theft. It causes a shortage of power supply to residential as well as commercial premises. The project aims to design and control a system that will automatically cut off the electricity connection directly from the electricity pole for those consumers who fail to pay electricity bills on time. When M.S.E.B officials arrive at that particular site to cut off the supply, some consumers argue with the officials and try to settle the matter by giving bribes. Even after disconnecting the supply, some consumers may bypass the system and connect the home appliances from the service mains. So to overcome all these issues a prototype is proposed which includes NodeMCU ESP8266, relays through which it will automatically cut off the electric supply as per given instruction by the microcontroller from the pole itself for that particular consumer who does not pay the electricity bill within a specific given period. Also, power theft will be taken care of by this proposed Smart energy-controlling system. Power theft is of various types such as direct hooking from the line, bypassing the energy meter, injecting foreign elements into the energy meter, physical obstruction, and ESD attack on the electronic meter. Hence this system is very useful as it can detect/monitor and overcome all the issues of power theft. The cost of this system is economical without compromising the functionality and accuracy of the system. The paper proposes automated billing of energy meters. It is just like a postpaid mobile connection. In the proposed work, the front

end is user-friendly and one can work on this software with minimum knowledge of computers and can read the meter by sitting in the office. This is useful for billing purposes in the electricity board authority. A GSM modem is connected to the energy meter. Each modem will have its own SIM (usually mobile phone SIM).

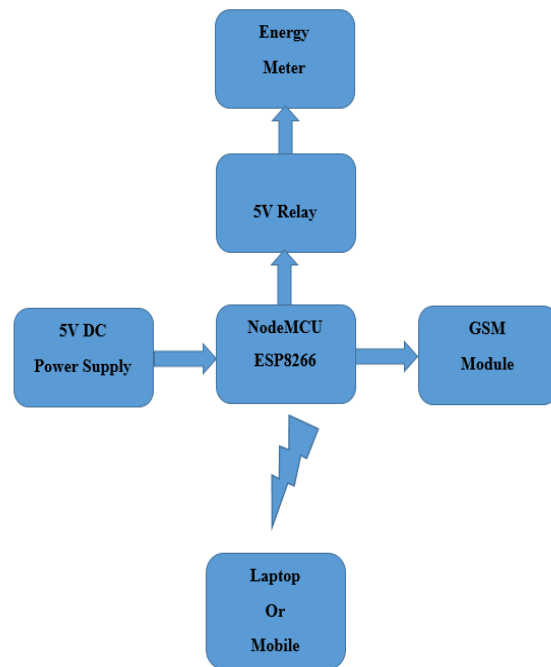
## II. METHODOLOGY

This project proposes a system to improve services efficiency by implementing an automatic cut off system once the customer's power consumptions reach to the limit. It consists of network embedded devices integrated with the main management system in data centre. The system consists of two subsystems: Central provider side and Customer side. The system architecture consists of NodeMCU ESP8266, GSM8001 and Relays. The energy consumptions are calculated by MSEB person monthly and if any consumer does not pay the bill, the online system will turn OFF the grid and SMS will be sent to the consumer.

### Block Diagram:



**Figure 1:** System Block Diagram.



**Figure 2:** System Over View Diagram.

In this project, we proposed a system to improve service efficiency by implementing the automatic cut-off system once the customer's power consumptions reach the limit. The system consists of network-embedded devices which are integrated with the main management system in the data center. The management system includes a billing module, an alert module, and an application module. This system consists of two subsystems; the Central provider side and the Customer side as shown in Figure 1.

Meanwhile, on the customer side, the subsystem, which is the meter reading, is done by a microcontroller. The Microcontrollers are a series of ARM-based microcontroller development boards designed for fast, flexible, and low-risk professional rapid prototyping. By summation of the energy meter readings, they calculate the Energy Power theft. To overcome all the drawbacks of the conventional system we are designing a "Smart energy controlling system". The system architecture of the Smart energy controlling system consists of NodeMCU ESP8266, GSM8001, and Relays. The energy consumption was calculated by MSEB person monthly. If any consumer does not pay the bill then the online system will turn OFF the grid and an SMS will be sent to the consumer. MSEB fetches the load supply to the consumers. The database center of M.S.E.B contains all the statistical usage data of electricity consumption of particular consumers. With the help of the controller, MSEB will Control the Consumer's load supply as per their Electricity bill payment. The control panel online has all the details to turn ON or turn OFF the grid supply for the respective consumer.

### III. MODELING AND ANALYSIS

#### Circuit Diagram And Explanation:

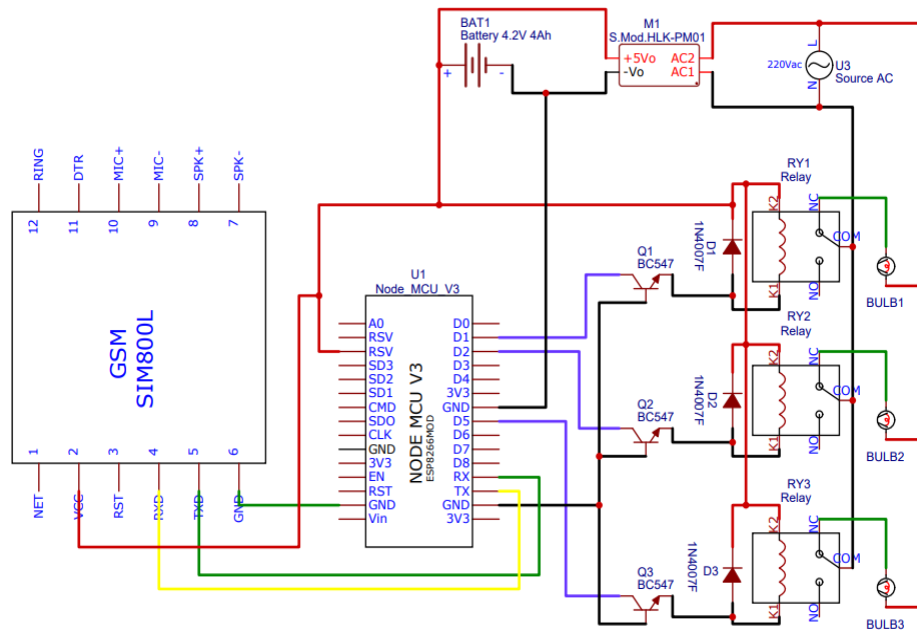
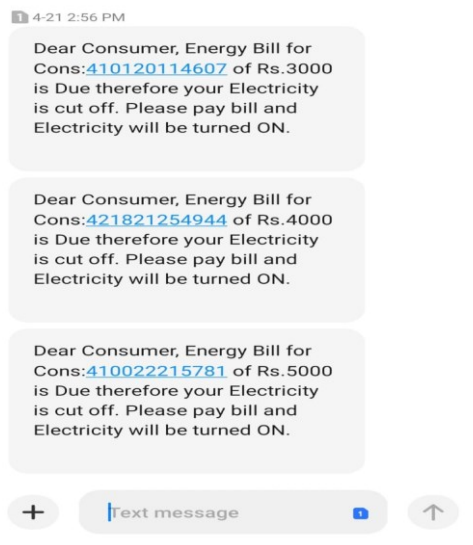


Figure 3: Circuit Diagram

Conventional system includes the electricity meters which are installed at consumer’s premises and the electricity consumption information is collected by meter-readers on their fortnightly or monthly visits to the premises. For an Electricity Power theft existing system had energy meters connect on each phase of line. By summation of the energy meter readings they calculate the Energy Power theft. In order to overcome all the drawbacks of conventional system we are designing “IoT Based Grid Cut-Off System for Non-Bill Paid Consumer”. The system architecture of Smart energy controlling system consists of NodeMCU ESP8266, SIM800L and Relays. The energy consumptions was calculated by MSEB person monthly. And if any consumer not pay the bill then the online system will turn OFF the grid and SMS will send to the consumer switching power is through the step down transformer. NodeMCU is wifi for continuous online monitoring. It online monitors the system and also trips the circuit via relay after getting signal command through NodeMCU. SPDT relay will disconnect and reconnect the supply as per the microcontroller’s instruction .When the consumer fails to pay a electricity bill after a given period the NodeMCU will automatically disconnect the supply of that particular consumer through relays and when the consumer pays the electricity bill it will reconnect the supply of that particular consumer. Basically a circuit will be fitted i.e. System in consumers home so from that we will acquire data and after acquiring we will upload/update the data on cloud service so that owner of smart grid (MSEB) and customer can access that data. The system consist of Esp8266 module which is a microcontroller and it controls the whole system. The system is connected in between the Mains Line and the Home incoming supply to the energy meter. In the circuit, we give 230V supply as AC input to meter. Input part and Output part of meter each have one phase and one neutral port this output phase wire connected to load (bulb) through relay. Relay by default is in close condition. Circuit starts working when relay is in close condition.

### IV. RESULTS AND DISCUSSION

This project proposed an IOT IOT-based grid Cut-Off System for Non-Bill Paid Consumers which helps track the energy consumption of the user & Control grid status when he/she does not pay the electric bill using a remote location. This data can be accessed by the user through a web page. So there is no need for human intervention. This system also provides a facility to send SMS to consumers. When they do not pay the bill and the grid supply is cut off Musersuser will get an alert notification. This feature helps control the energy consumption. Hence, it reduces the wastage of energy and helps in creating awareness about energy consumption.



**Figure 4:** Alert SMS send to consumer.

## V. CONCLUSION

The project model reduces the manual manipulation work. The use of Esp8266 in our system provides the numerous advantages of wireless network systems. In this project, we proposed a system to provide early warning to the users of electric power provided by the government. In the present situation, all customers are using manual communication. To reduce manual efforts and human errors, we need to have some kind of automated system monitoring all the parameters and functioning of connections between the customers and the electricity board. Also by implementing this system, we can control the usage of electricity on the consumer side to avoid wastage of power.

There is a need to utilize energy in a better and efficient way which is beneficial in the power sector.

## VI. REFERENCES

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