# IOT Based Electric Bill Generation

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**Abstract:** World of technology is developing very fast in which devices are expected to perform work automatically and at real time.The world is moving towards information technology and different automation systems which are expected to be more integrated and complex, which are the use to develop better quality services in any fashion. In this paper we are using Internet of things which seems to connect devices to the internet. In this paper we are connecting electric meter to the internet to ease the human life. Meter reading is done for the electricity, gas or water consumption where meter is used to record the consumption of this energy. In this paper we will talk about electricity as it is the essential need of today's world. In today's scenario the electricity proving company generate bill by taking snapshot of the meter reading. Submit the reading to the office where bill is generated on basis of snapshot. Now the generated bill is send to the users address. In this whole process due to human intervention the error rate is more. Due to this accuracy is not achieved. For this purpose we are proposing a IOT based electric bill generation where collection of units consumed, generation of bill and sending of bill to the user will be done automatically. In this paper for reference we are showing consumption of laptop batter. Based on consumption of battery we will generate bill. This bill will be send to the user by company. This model is more portable, flexible and can integrated with different architecture.

**Keywords:** AMR, Image segmentation, zee bee, GSM.

## I. INTRODUCTION

Now days in each and every sector there are many people consuming electricity. The people are not satisfied with the services provided by power distribution companies, also electricity authority. The government also realizes the problem occurring in the existing system. Today employee of the company visits each and every house take the photo of the meter or note down the readings of the meter due to which time required to take snapshot increases. This snapshot is submitted by the employee to the company databases. Now from the submitted snapshot bill is generated. Due to lot of human interventions accuracy in the bill generation is not achieved. Error rate is very high.

If the door is closed for more than two months then the bill is calculated on average of  last two or three months. Due to this consumer faces problem for correcting the bill. Many times wrong snapshot is taken on wrong people name, this is also the major issue. This requires large number of man power and also long working time to compute the bill. Sometime meter is also located at the remote location where it is not possible to reach in first visit. In the first visit work is not done due to which employee has to revisit the site. Sometimes the printed bill gets misplaced or it is not delivered to the appropriate address. The country like India which has huge population requires long hours to generate the bill. So we are proposing a solution to this problem. Where we are using IOT based electric bill generation where we are monitoring the electric meter continuously and generate the bill based on consumption of electricity. For reference we are referring laptop battery and based on consumption of laptop battery bill will be generated. The consumption

of the battery is in terms of percentage we will convert it in terms of units and calculate the bill. Due to this the there will be no intervention of human so there will be no error in the bill generation. Also this will require no additional time to generate the bill. Moreover bill will be more accurate and will be given to the appropriate customer.

AMR is a technology using which automated electric bill generation process was done. It was developed in 1962 by AT&T, but was not successful. Then another project was implemented where meter reading was taken using camera and image processing. The camera will rotate and take reading of the meter and send that snapshot to the server using GSM and bill was calculated. The drawback was if the dust get over camera screen the pure image will not be taken due to which the bill will not be generated.  Our paper does not contain any such type of disadvantage.

## II. LITERATURE SURVEY

For Communication to the server many options are there as wireless or wired such as cable networks, and the different GSM modules, which is known researchers. Different Countries Trying to implement this idea. From the different papers we have different researcher work regarding our new concept.In paper [1] (2014) Pradip Kulkarni and Manisha Shinde has publish a paper on automation of electricity billing process in that new architecture that the electricity board has manual process and to remove that process they introduced a module in which data is gather from the energy, water and devices

and transfer to the centralized station from the billing purpose. The data is collected using single camera, with means the camera is placed in front of the meter of the everyone's house and the camera will capture image of meter and server will directly fetch that data from the each house, so that human interaction is totally avoided. ARM7-LPC 2138 is used as the interface between the devices. After that the image will reach to server and undergoes the different processing through Matlab, so that the every month reading is stored in the database of the electricity board. So the technology used in this paper was image segmentation and the AMR, zigbee, so that advantages of this technology was this technology is used properly, and the disadvantages for this architecture was that it is costly. In paper[2](2015) R.G.Yadawad has publish on intelligent electricity billing and the maintenance system in which new way of billing process there was many errors in the different models which were introduced earlier so in this paper the model used was through mobile agents. This Paper tells us about the how the new architecture is more feasible using mobile agents.

The proposed model of this model consists of the server, digital meter, and smartcard, software agents, PLCC and directly sync with the bank account. The server is used as a central entity which supports overall activities of the system. The main works of the server is to maintain the central database of the electric board with includes the user information and their smart cards information. Bank account is directly sync in the database to the user account. Digital meter is installed to the users' house as it will work as an embedded system that Is consist of the processor, which will work such as user functionalities, communication with the servers and the power supply. Smart cards is provided by the electric board and the smart card contains 1.unique Identification number and Bank Information. Software agents they have capabilities of the creating better client-server architecture, here the mobile agents gives that information but they are not good for the data transfer. FTP is used for the data transfer over the internet. Power line carrier communication does the work of transmit the data over the power lines, it is a deepest capillarity in the world since the power lines introduced. It operates the radio frequencies generally below 600 KHz transmit over the lines. Sync with the bank account the server maintains the record of the billing process so that bill amounts is automatically deducted from the user account. Or in another way user may also pay by cash or the mobile phones. The technology used in this model was GSM, and the advantage by using this architecture was the mobile networks and the fast way for processing of the bill, and as mobile networks are using it requires more mobile towers to communicate which will also increase the cost this is disadvantage of the this model. In paper [3] (2014) Nidhi Gaur has publish on Prepaid electricity Billing Machine using FPGA, this paper shows the advancement of the technology. This paper includes PEBM Design implementation with description, Flow chat and FSM. How the results are on the Xilinx Spartan6

FPGA Device is explained, it also explained the design specification over Power Supply, total current, logic utilization and the memory and timing information.

| Sr.No | Name of the paper | Technology used | Advantages | Disadvantages |
|---|---|---|---|---|
| 1 | Automation of electric billing | Image sementation,AMR,Zig-bee | Technology used properly | costly |
| 2 | An Intelligent Electrical Billing | GSM | MOBILE NETWORK, FAST | MORE TOWER |
| 3 | Prepaid Electricity Billing | FPGA | Long time availability | Can be updated customer side |

Table No: 1 Literature Survey.

## III. PROPOSED APPROACH FRAMEWORK AND DESIGN

A. Problem Definition

The Electricity Board has got used to the manual process and they go along with it even though there are many concerns associated with it. Because of the human errors after getting faulty bill, it is problem of user to get it corrected from the electricity board.
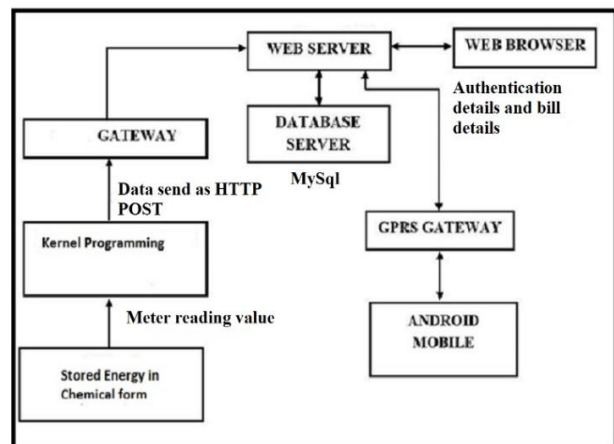
B. Proposed Architecture



Fig 2: System architecture

IOT based electric bill generation is a technology which is used to gather data from energy metering devices and transfers it to the central databases in order to analyze it for the billing purpose. In this paper proposed system is to discuss automation of energy meter with the use of energy stored in chemical form. The reading will be taken through the kernel programming. Kernel programming will give battery status. This status is send to the web server through gateway. On web server bill calculation process will be done. The calculated bill will be send to the customer through browser and GPRS gateway.

Objectives of the proposed work are
- To lean about different energy meter reading systems.
- To study and understand the various methods and models used by various researchers for energy meter reading systems.
- To take necessary action to make the solution reliable, robust and effective.
- To avoid human intervention in bill generation process.

**Algorithm:**
- **Step1:** Fetch the laptop battery status. The status will be in percentage form.
- **Step2:** We will fetch the battery status using kernal code as follows:

Process p=Runtime.getRuntime ().exec ("cmd /c dir");

- **Step3**: Convert the battery percentage into units form
- **Step 4**: Store or send this reading to the cloud.
- **Step 5**: Calculate the bill by taking reading from the cloud.
- **Step 6**: Send the bill to the customer via email.



Fig 2: Flow Chart

## IV. WORK DONE

In this section we are discussing the practical implementation and scenarios.

A. Input:
Input for this experimental practice is battery status from laptop battery.

B. Hardware and Software Configuration

Hardware Requirements

| Devices | Energy meter, Laptop battery, GPRS module |
|---|---|
| Microcontroller | ARM LPC 2138/2148 |
| Processor | Pentium IV 2.6 GHz |
| Ram | 512 MB DD RAM |
| Monitor | 15" COLOR |
| Hard Disk | 20 GB |

Table No: - 2

Software Requirement

| Front End | Java |
|---|---|
| Operating System | Windows 7/8 |
| Database | Oracle |

Table No:- 3

C. Actual Implementation
We are implementing the project in three phases
1. Phase
In this phase laptop battery status will be fetch using java code.
Java:
Java is a pure object oriented language. Java runs on many operating systems. It is platform independent. It is platform independent because java compiler converts the java code into bytecode. When the code is executed the java virtual machine interpreter converts the byte code into machine language.
Java is created for four main reasons:
1. Simple,object oriented, distributed, easy to learn.
2. Robust and secure.
3. Independent platform.
4. Possible to create interpreter of language.

We are using java in our project because in java it is easy to do kernel coding and less code require doing so.

2. Phase:
In this phase we are converting batterypercentage format into units of energy consumed.

This thing we are doing using java.
3. Phase:
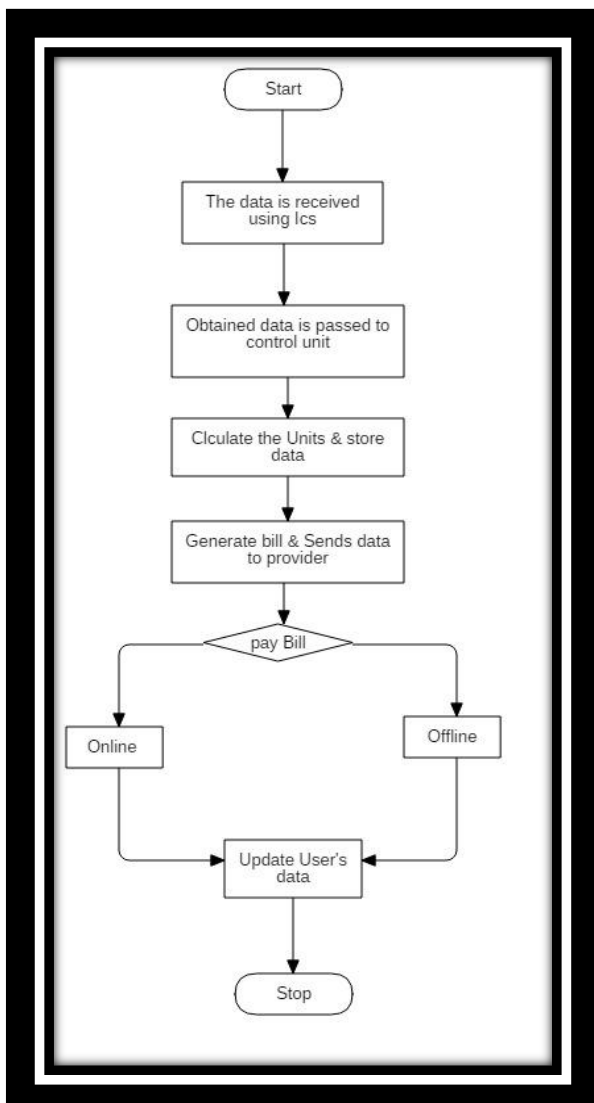In this phase the units of energyconsumed is send over the cloud.

4. Phase:

In this phase the bill is generated from the units of energy stored over the cloud and the bill is send to the appropriate user.

D. Output:

The bill will be generated and send to the user.

## IV. CONCLUSION AND FUTURE WORK

In this paper with the help of proposed architecture it is easy to eradicate human intervention in electric bill generation. If the customer gets the wrong bill he has to visit the board office stand in a queue to correct it. All this errors are avoided by taking reference of meter reading as the consumption of the laptop battery. Send the data wirelessly to the server and maintain the databases at real time. This system take meter reading at very less time and also avoid the wastage of the paper. In future it may be possible to take reading from the meter directly without any external hardware and send the data to the server at real time.

## ACKNOWLEDGMENT

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