

Electricity Billing System To Control Unnecessary Electricity Consumption

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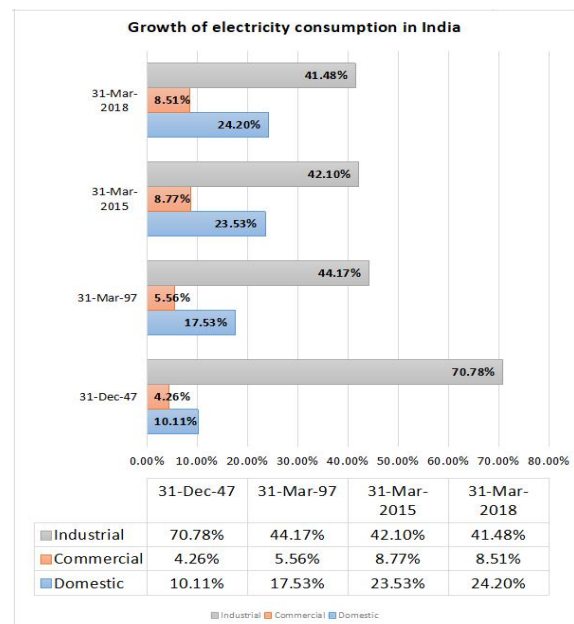
Abstract- The Internet plays a vital role in this era of automation, digitization and economic development. Hence, by using the internet, human beings life is getting much better as almost all things are automated and new machine replaces the old machine. Nowadays the internet is essential in day to day life. The Internet provides a platform for connecting devices and controls the devices according to our needs. In this paper, we focus on the electricity billing system and home automation by using a smartphone. This billing system gives us the energy consumption of each device separately. The system which we are going to design is economical and easy to implement. In this paper, there is a detailed survey on the home control automation and Billing system.

Keywords- Relay model, Web service, GSM, Arduino Uno-WiFi, Billing, Java, Embedded C, Mysql, Android, PHP, Internet of things(IOT), web designing, Automation , WiFi module.

I. INTRODUCTION

The Concept of "Home Automation" has existed for many years. X10 is the first general-purpose home automation network technology developed in 1975. At starting it uses electric power transmission wiring for control and signaling, in that signals involves brief radio frequency of digital data. Which remains the most widely available. Home Automation involves the automation and control of lighting, heating, ventilation, appliances, air conditioning and security of all the systems which are very essential. After the survey, the scenario knows that in this country of digitization, not automatic devices which are often referred to as smart devices from people. Earlier in the 1990s, almost every home consisted of electrical appliances such as television, heater, air conditioner, washing machine, induction, electronic security system and other electronic and electrical devices that were manually controlled making a smart home. With the evolution of IoT all these manually controlled electrical and electronic devices can be controlled automatically. In 2011 it was predicted that IOT'S application will focus mainly on the smart city and digital agriculture construction. The main concept of IoT is that it can create a virtual connection between a hub or a network and electronic and electrical objects. The virtual connection helps to control, locate, and

track down these connected objects. In India, the use of electrical energy in the industrial area was more than that of a domestic area in the early '90s. In 1947, the use of electricity on domestic bases was 10.11 units and industrial bases were 70.78 units. According to the Electricity Sector in India, this scenario has changed. In 2018, the use of electricity on domestic bases is 24.20 units and industrial bases are 41.48 units. Also, this article says that Electricity production in India has rapidly increased from the year 1985 – 2012. The increased figures are, in 1985 it was 179 TW-hr and in 2012 it was 1057 TW-hr. This shows that with an increase in population the use of electricity has increased and there are very fewer methods of conservation of electricity available. The use of electricity is decreased in the industrial area because of new and smart automated machines, but in the domestic area, customers use appliances without any awareness. They are not aware of which device consumes what amount of electricity until the bill is received.



II. SYSTEM ARCHITECTURE

A) Existing System:

Here are many systems are available in the market which is based on automation and Internet of things(IoT)

which provide online electricity bill payment through smartphones or websites. This system shows the combined monthly energy consumption of all devices. The user can pay electricity bill online. Some systems use a microcontroller-based bill generation system. This system uses digital displays and they need manual information filling in the database. One has to enter the customer's house for taking the readings of meter which causes disturbance to the customer. Manually entered information can be wrong or misplaced. This will lead to error i.e. wrong electricity bill will be received by the user.

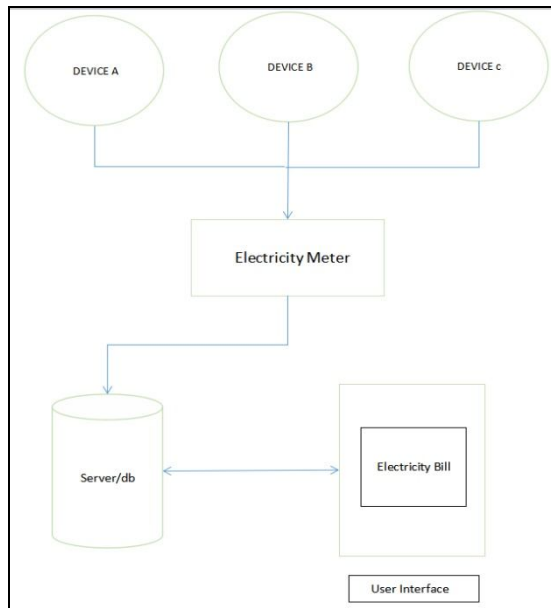


Figure 1: Existing system

A) Proposed System:

The smart framework of electricity billing system mainly focuses on, showing the user detailed information about electricity used by all devices in his house. The user will be able to access this software application from anywhere all around the world by using a smartphone/computer. Users can control and view each device separately. Users can control these devices by ON/OFF buttons provided in the application. There will be a separate display box where the energy consumption of each device will be displayed.

Working of the System:

- User will On/off the device using the App/website.
- That On/off status using PHP will be forwarded to the database.
- The database will have the date and timewise status(on/off) of each device.
- Then turn around time of each device will be calculated using a scheduling algorithm.

- We will get the total time for which the device was used. Then according to that time, the electricity bill will be calculated.

The system architecture will be as follows.

- Devices available in a particular room will be connected to the relay board using cables.
- Relay board will be connected to Arduino UNO which has a WiFi module in it, which will provide internet access.
- There will be a web server for database storage and that server will be connected to Arduino UNO –WiFi module through URL.
- Through coding we will find out turn around time of each device and bill will be generated of each device. Thus by combining the electricity consumption of each device altogether, we will get the final bill of the house.
- The user has to only enter the initial and final date in the application so that he will get Bill of that particular period.
- According to the user entered data, they will receive notification of the final bill and can make the payment online.

Hence, in this system users will be able to find out which device uses more electricity in a particular period. Users can control the use of devices and save electricity.

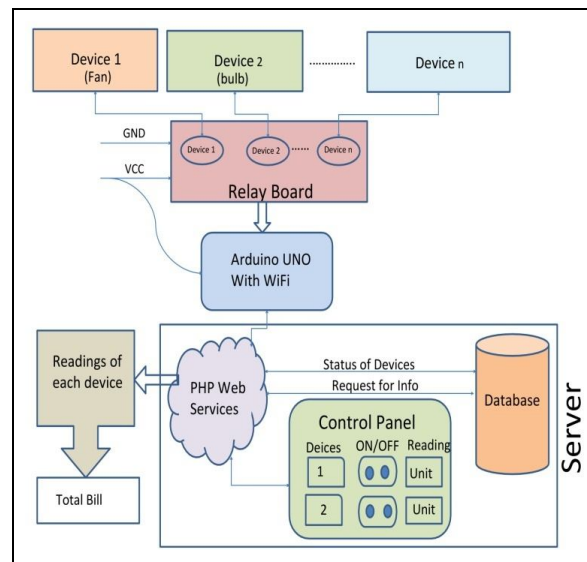


Figure 2: Proposed system

III. LITERATURE SURVEY

Name of the paper and idea of extraction:

- 1) Electricity Bill Management System : The idea of bill payment system and how it managed. In this paper its is shown how to maintain the customers bills and payment
- 2) Design and Implement of Network Billing System: The idea of three layered architecture of billing system i.e. authentication method , data collection and data manipulation methods.
- 3) Smart billing system framework for economic internet connectivity: The idea of frame work model of internet billing system.
- 4) Home Automation Using Internet of Thing: The idea of controlling and monitoring various electrical devices in house.
- 5) Microcontroller based automated billing system: The idea of automated billing system using digital display i. e. digital energy module.
- 6) Smart Electricity Distribution in Residential Areas: The idea of prepaid billing system.
- 7) Identifying the Nature of Domestic Load profile from a single household electricity consumption measurements: The idea of analysing electricity consumption in a domestic use.

IV. RESULT

After connecting devices to our system , the bill will be calculated as follows:

Devices Connected	Electricity consumption per hour(watt)	Time of the device in ON state per day(hr)	Total power consumed by device in a day(watt)
Bulb 100 watt	100 watt	2 hr	200
LED 60 watt	60 watt	3 hr	180
Fan 86 watt	80 watt	2 hr	160

Total power consumption in a day: 540 watt and 0.54 units

Time for which the device was on will be calculated using **Turn around time (TAT)** concept of scheduling algorithm.

$$\text{Turn around time} = \text{Finish time} - \text{Arrival time}$$

Here, Finish time = Time when device was switched off

Arrival time = Time when device was switched on

For Bulb of 100 watt was on for 2 hours,

Power consumed per day : 200 watt

(1000 watt = 1 kwh , 1 kwh = 1 unit)

200 watt = 0.2 unit consumed per day

In this way , the electricity consumed by each device in units will be displayed separately to the user .

Advantage of this system: In case , if any device starts consuming more electricity the user will be able to find that with help of this system.

The user will also be able to analyse and control the usage of the devices in a day .

V. CONCLUSION

In this project, the user will be able to access different electrical devices in the house using a software application. This software application will be able to access a computer system as well as smartphones. The user can use the application anywhere around the world and access the devices accordingly. This app will show the energy consumption of each device separately hence the user will know how much energy is consumed by each device separately. If any device is consuming more electricity than required then the user will know it can change the respective device. This feature will help the user to save a lot amount of electrical energy. According to a survey, it is concluded that more energy is consumed in domestic use than in industrial use, hence this app will mainly be for appliances used for domestic use. The online payment system can also reduce human efforts of paying the bills. The customer will be able to view all the details related to the devices connected in the house and also regarding the bill payment.

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