AUTOMATED ELECTRICITY BILL GENERATION

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Abstract—The concept proposed here is very useful for state electricity department by which the power consumption data along with tariff data will be sent to the concern authorized mobile phone that belongs to the bill raising person who belongs to the department. The same system is also very useful for energy consumer by which he/she will have vigilance over their energy consumption and accordingly they can plan to reduce the billing/tariff rate. To prove the concept practically, we need one electronic energy meter and its out generates pulses according to the load connected to it. Since the meter generates analog pulses and whereas the controller used here will not accept these analog pulses, these must be converted in to digital. The digital pulses produced by the circuit are fed to the 89C52 microcontroller chip. Now this chip is programmed to count and display the pulses in one row and accordingly tariff rate also will be displayed in another row. The display section is designed with LCD and it is interfaced with controller chip through its output port. With the help of a GSM module interfaced with same controller, the data will be transmitted to the concern mobile phone number must be stored in to the processor. Since the data will be transmitted continuously, the concern person can raise the bill when required. Raising the bill and uploading the data in to server is the job of department and it is not in our control. The duty of consumer energy meter is to send the tariff data so that the person who is visiting each and every home to take meter reading can be avoided. The energy meter used here is designed to generate 1600 pulses per unit consumption which takes long time to complete the demo in less time. Therefore each pulse produced by the energy meter is treated as 1 unit consumption and accordingly tariff rate is also programmed such that for 10 pulses treated as 10 units and RS; 1/- per unit. Above ten pulses and up to 20 pulses, tariff rate fixed as RS; 2/-, similarly for above 30 pulses tariff rate is fixed as Rs; 3/- per unit. Accordingly the controller chip is programmed to read and display the energy consumption. Similarly tariff rate will be calculated internally, displayed and transmitted through GSM module.

Keywords—*Electronic energy meter, digital pulse generator circuit built with LDR & timer chip, main processing unit built with 89C52 microcontroller chip, GSM module.*

I. INTRODUCTION

People were aware of the shock electric fish produced even before they had a better understanding of electricity. Early in the 19th century, electrical science advanced quickly. However, the late 19th century saw the biggest strides in electrical engineering. Charges exert a force on each other when they are present, an action that was recognized in ancient times but not fully understood. This force is known as the electrostatic force. The scientific community holds that current is motion in an electric charge with an ampere scale. A notion known as an electron is nothing more than two charge particles that generate electricity. Electrical conductors are materials that permit electricity to pass, while insulators are materials that do not permit electricity to pass. Electricity is often produced by electricity generators, but it may also be obtained chemically from sources like electric batteries or by alternative methods from a broad range of energy resources. There are an increasing number of uses for electricity, which is particularly practical for transferring energy. The 1870s saw the invention of the incandescent light bulb. As a result, one of the earliest uses of electricity that the general population could access was lighting. Even in the industrialized Western world at the beginning of the 20th century, electricity was not widely used. During the Second Industrial Revolution, electricity rose to prominence. Since the latter half of the 20th century, when electricity stopped being a novelty and became a need of daily life, popular culture has only paid it significant attention when it stops working, which is typically a sign of calamity. In our modern life, electricity plays a significant role. It has now become apparent that life cannot exist without electricity.

Electric meters that are permanently installed in each person's home are used to measure how much power is used by the commons. To compute the amount of energy utilized, this is then routinely logged by the distributor, most often a government worker. Conventionally, a human operator often reads electricity meters to determine how much power is being used. He needs to knock on each door and provide each customer their separate bill slips for the usage. To determine the quantity of units used, they visit each home. Also sometimes, when all the appliances in a household are turned on at the same time, the electric circuit gets overloaded. This leads to low power supply to the appliances thereby leading to constant flickering of lights, fan running on low speed, heavy load appliances not receiving sufficient power etc. The manual reading process contains flaws such reading mistakes, inaccuracy, outside factors that affect the measured numbers,

and it is a quite time-taking to complete the task because of these issues. A lot of labor is also needed for this method. A suggested automated energy meter reading aims to address each of these problems. The labor force might be freed up to focus on other projects by automating the process of reading meters. Furthermore, when an LCD screen is linked to the device, the consumers are informed about the power usage and the electric circuit load. The system also notifies the user when the circuit is tending to get overloaded. By doing so, excessive usage will be reduced.

II. Related Work

Energy management is one of the many everyday applications where the Internet of Things (IoT) is crucial. Digital meters also known as smart meters are the similar size as conventional meters. Since the smart energy meter takes highly precise values, the utility can better plan network development and power quality. A Short Message Service (SMS)-based system for reading electricity meter data remotely in can also be implemented. The Global System for Mobile Communications (GSM) networks have been put to use receive the SMS. Hybrid Automated Metering Reading System (AMR) was proposed by Handoko Primicanta. GSM and ZigBee technologies are combined in this system. GSM will be used to connect the data collection device to the main computer, and the energy meter will house the ZigBee module. A secure, affordable automatic meter reading system was suggested to be designed and implemented. Utilizing GPRS (General Packet Radio Service) technology, the suggested system calculates and communicates the overall electrical energy usage to the main server. Accurate digital meters, transmission infrastructure, and a billing server make up the system's three essential components. AMR systems are made with affordable off-the-shelf components.

Another system was proposed with the notion of a pay-as-you-go electricity meter utilizing an AT89S52 microcontroller. The principle behind it is "First pay, then utilize it." The remaining power is shown on the LCD after the energy spent has been tallied using an LDR (light Dependent Resistor) circuit. The different communication methods for applications involving automated reading were assessed. To automate the EB meter reading system, several solutions have been proposed. Additionally, reading data is sent via power cables. However, utilizing alternative technologies is more cost-effective than transmitting data across power lines.

III. The Proposed System

The suggested method automatically computes the power used at each home, and the data are shown to the residents at their EB box. This aids in the users' awareness of their utilization and encourages them to cut back if they are over-utilizing the resources at their disposal. Through the GSM module, the measured values and bill are sent to the EB database. Human effort is therefore reduced. Also, the load on the entire electric circuit of the household is also displayed onLED screen in order to avoid overloading of the circuit.

The suggested system's operation consists of two main components.

i. Hardware Module

ii. Website Module

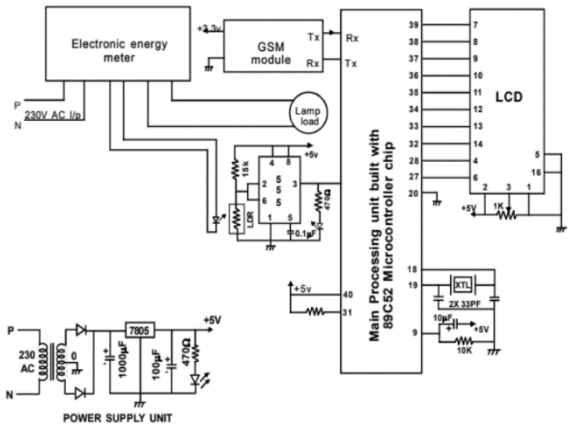


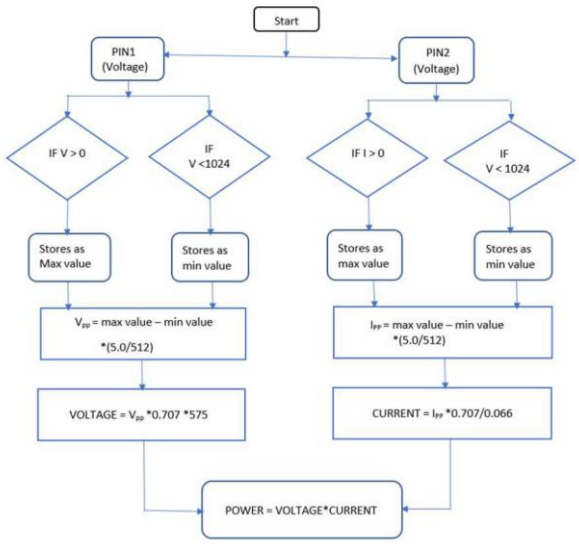
Fig.1 Circuit Diagram

IV. Implementation

The suggested method automatically reads the power used at each home, and the data are shown in the LED at their EB box. This is particularly helpful since it enables the users to be conscious of their consumption and lessen according if they are exploitation the resources at their disposal. Through the GSM module, the measured values and bill are sent to the EB database, decreasing the need for human resources.

- *Extraction and Processing of Data*

Once the switch is turned on, the power meter attached to the load begins to read the energy used by the load. An LED bulb inside the energy meter blinks 3200 times for every unit used. The Arduino now calculates this, and a bill is created. The bill created and the amount of the unit utilized are shown on the LCD panel before being sent to the cloud. Now, the user has the option of checking the LCD panel linked to the meter or logging into their account to confirm the unit they utilized. Initially, the total wattage of all the appliances in the household is calculated. Then the maximum load that the electric circuit can handle without affecting the power supply to all appliances when they all are switched on is calculated. In most of the cases, the total wattage of the appliances



exceeded the maximum load of the circuit. So, an alarm is installed in the system and configured in such a way that when the electric circuit load is tending to its maximum, then the alarm will go off, indicating the user to turn off a few appliances to reduce the load.

With the aid of the GSM module, the measured values are sent to the cloud. The cost and readings will both be presented in the cloud platform. At the nearby EB station, customers may pay their bills every forty days, and the data can be reset.

Fig.2 Process flow of the system

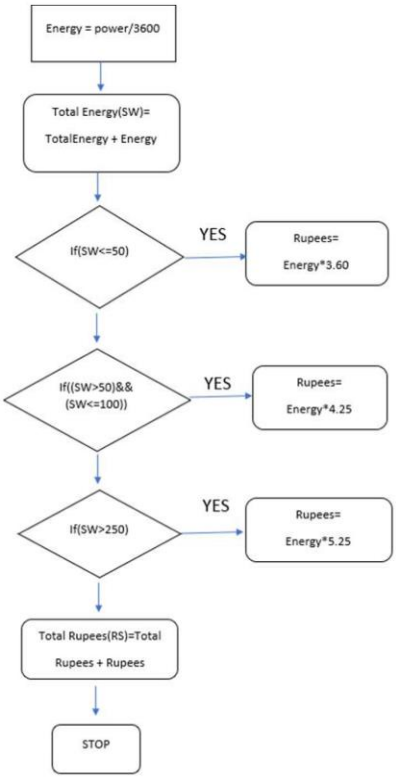


Fig.3: Amount Calculation Flowchart

Fig.4: Hardware Connection

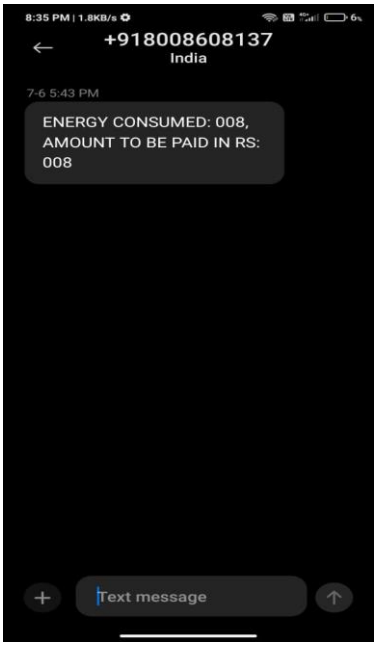


Fig.5 Generated Bill

V. Conclusion

The electricity meter reading system offers advantages such as swift conveyance speed, high reliability, strong real-time, and low running cost, according to operational experience and practice. According to the testing findings, the automated electricity billing system outperforms the conventional method of obtaining readings in several ways. The automated detection of the consumed number of readings is how the suggested system would operate. The user is then shown these readings at their EB box. This makes it easier for the general public to be aware of power and to control it if they feel they are using it excessively. Because everything is automatic, less work is done by people. There is no longer an external factor delaying the taking of the readings. So there exist values that are error-free. Therefore, accuracy has been maintained. Future work will entail modifying the suggested technique for detecting unauthorized electricity consumption.

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