IoT based Automatic Electricity bill generation with theft detection

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ABSTRACT

In this proposed system, a customer can view bills when necessary. The main idea of having an Email service is to have better communication with consumers and email is the ideal way to achieve it. When the bill is processed by the system, billing details are sent via email. This is a real time system. Wireless data transmission and receiving technique is used. This will provide an additional facility of wireless meter reading with the same technique and in same cost. This will protect distribution network from power theft done. The power theft detection system is used to detect an unauthorized consumption of electricity from distribution lines. Implementation area of this system is a distribution network of electrical power supply system. The existing system is not able to identify the exact location of consumption or tapping. This system finds out whether the theft is taking place or not.

Keywords: Current sensor, Internet of Things(IoT), ESP8266 WiFi module

INTRODUCTION

Electricity Billing is one of the most important and critical function of the Home. The meter reading, even though it looks simply, is far more than simple and involves processes that can give various problems. The most common problems that are currently seen is the result from the manual processes followed by Calculation errors, delays in system updating and fault tracking issues are the major problems that companies find difficult to find answers for. This project suggests a server-based system to collect, process and notify consumers about the electricity consumption. This system will be reliable, efficient and accurate to suit the requirements. The proposed solution uses wireless Technologies, over a solution which uses server to handle an authorized person. Automatic Electricity bill generation system can be divided into two parts that is hardware and software. Hardware consists of electronic components whereas the software part consists of the server according to communication medium used. [5]

In existing system for collection of energy consumption data is that the representatives of MSEB monthly comes and visit every residential, takes the snap shot and manually reads the consumption data from the meter. The burden on the MSEB authorized person is reduced and other new features have also been introduced. Customers can now easily view their current electricity usage using server. The electricity theft can be termed as fraud which can be in the form of meter tampering, illegal connections, billing irregularities and unpaid bills.It is observed from the study of reported work that in the real world, IoT and PLC based meters can improve the efficiency of the power system and can also help us to analyze the unnecessary loss of power in different areas.

PROPOSED WORK

More efforts taken for bill generation. Customers face immense problems with the current procedure of using this manual process to calculate Bills. This is a big burden for them. Serious issue is that they do not have a proper way to communicate with their consumers. There is also no facility to compare the previous month's electricity usage with the current

month. The objectives of proposed system are as follows: -

1. To optimize time used for Bill Generation
2. There should be 24/7 connectivity.
3. Immediate access to the user
4. Better security concerned to the theft.
5. Reliable and easy to handle

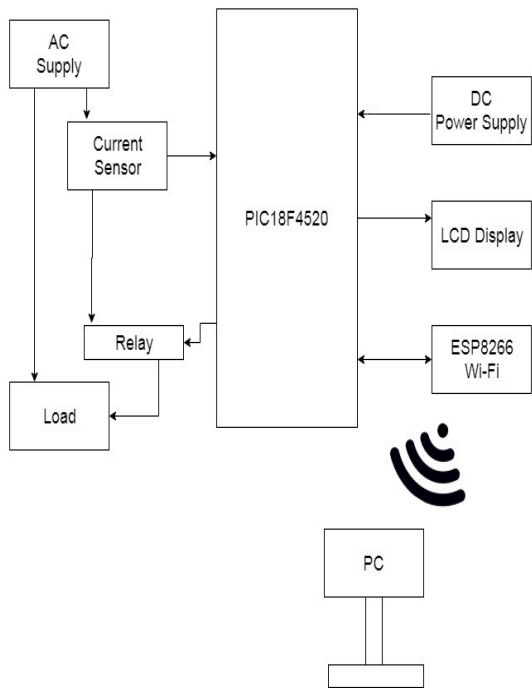## Block Diagram and its Description

Fig 1. Block Diagram

The block diagram consists of an PIC board, an ESP 8266 Wi-Fi module and a 16*2 LCD display. The Wi-Fi module is the main component used in the IOT operation. The center piece being the PIC provides the connection between the different components of the proposed system PIC is the core of the system which is necessary for the principle operations that are necessary to be carried out such as the automatic electricity billing and tampering detection inputs from the tampering circuit. The load represents the devices that require the electricity to operate. The ac supply is connected to the system through the transformers to power the system. The Meter is also connected to the system to automate the power usage of the household. The readings from the energy meter are then processed and are updated over the Wi-Fi through the ESP 8266 Wi-Fi Module. If any tampering is detected the system updates the situation on the webpage used to display the energy readings. After updating the energy readings on the webpage, the system then displays the energy readings on the LCD display

Electricity theft can be termed as fraud which can be in the form of meter tampering, illegal connections, billing irregularities and unpaid bills. The financial records indicate that most of the theft of electricity is in the form of stealing of power. This will protect distribution network from power theft done
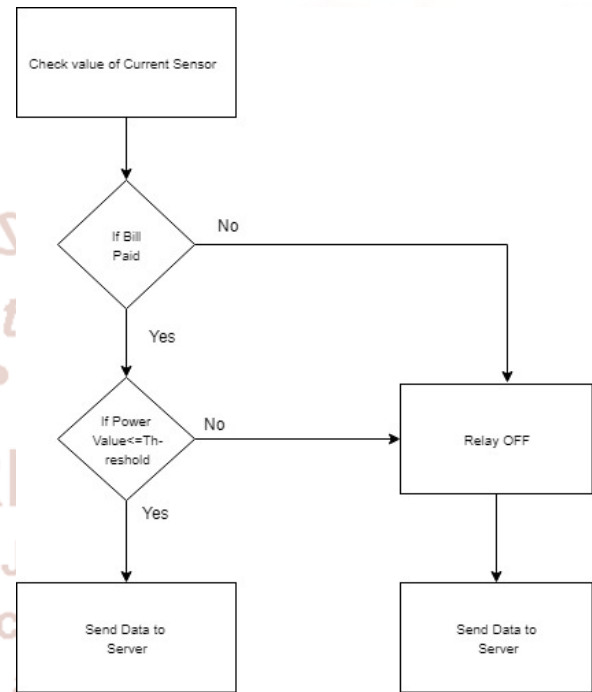
Flowchart

Fig 2. Flowchart

IMPLEMENTATION

The system is designed to generate automatic bill monthly and display it on LCD and the billwill also be sent to the server. The bill can be set up to a level and due to this theft detection is minimized. The current sensor gives the value of current and it is displayed on LCD. The generated bill is being sent to the user through e-mail. The theft can be detected by setting a certain value to the consumer and if it goes beyond that level then theft is being occurred and thus the electricity gets shut down.

The Automatic electricity meter using Wi-Fi module can be easily deciphered in to two parts. The first part being the physical part and the second one being the Webpage.

The physical part:
It consists of the PIC board, ESP 8266 Wi-Fi module, 16*2 LCD display, and power supply.

PICBoard:

PIC is a microcontroller board and it is based on the AT mega 328P. It consists of 35 digital I/O pins and 10 analog input pins and a crystal oscillator of 16MHz frequency and power supply ICSP header and a reset button.

It can be powered with the power jack at the start and later can be powered with AC to DC adapter or with a battery.

ESP 8266 Wi-Fi module:

The ESP 8266 Wi-Fi module is a low-cost component with which manufacturers are making wirelessly networkable microcontroller module. ESP 8266 Wi-Fi module is a system-on-a-chip with capabilities for 2.4GHz range. It employs a 32-bit RISC CPU running at 80 MHz It is based on the TCP/IP (Transfer control protocol). It is the most important component in the system as it performs the IOT operation. It has 64 kb boot ROM, 64 kb instruction RAM, 96 kb data RAM. Wi-Fi unit performs IOT operation by sending energy meter data to webpage which can be accessed through IP address. The TX, RX pins are connected to the 7 and 8 pins of the PIC microcontroller.

16*2 LCD display:

LCD (Liquid crystal display) screen is an electronic display module and finds a wide range of applications. 16*2 display means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5*7 pixel matrix. The 11, 12, 13 and 14 pins of the display are used as data pins for PIC interfacing. It is used to display the wattage. Current sensor is placed at the distribution points of the house lines. The output of Current sensor values is given as input to PIC microcontroller convert analog inputs to digital. Then PIC compares the input current and the same of output current. If the unit are raised compare to bill generated unit then theft is detected.

* **User**: This is user who checks the records of previous bill status. User stores data over DB so that other data users can access data from DB.

* **Bill generation person**: Task of this person is to check the running bill reading and give the input of that reading value to application and our system will automatically calculated the bill.

* **Email Generation**: Once the bill generated then our system will send bill details via Email to the customer.

* **Admin**: Here admin check the all records for security purpose. Check all details to the user. Admin have all authority to manage all records.

JAVA:

Java is a general-purpose computer-programming language that is concurrent, class-based, object-oriented, and specifically designed to have as few implementation dependencies as possible.

MySQL:

MySQLis an open-source relational database management system (RDBMS). MySQL works on many system platforms.

CONCLUSION

In this paper, we have provided extensive coverage of the Automatic Electricity bill generation system. Our proposed system will be able to complete the gap between a user and the MSEB and take their existing system to a wholenew level. Our final objective will be to make a prototype model of our project.

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