

Smart Home And Energy Management Using IOT

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Abstract

Power utilities and government are facing a lot of problem with the increase in demand for the electricity. Nowadays electricity consumers (mainly in industry) are asking for better customer service, high accuracy in energy measurement, good & healthy power supply and timely data. After emerging a rapid increase in digital technology and computer communication system we had seen a plenty of revolution to replace old systems by newer ones .The main aim of the project is to minimize the queue at the electricity billing counters and to intimate the recharge amount (prepaid meter) automatically. The work system adopts totally a new concept of “prepaid electricity”. The IoT technology is used so that the consumer would receive messages about the consumption of power (in watts) and if it reaches the minimum amount, it would automatically alert the customer to recharge. This new system provides better electricity distribution for all the places like privates sectors and own housing projects, this implementation of the project will help in perfect energy conservation and also in doing away with the unnecessary hassles over incorrect building. It also plots live energy consumption curve monitoring using IoT. The automated prepaid billing system will keep track of the real time consumption and will leave little scope for disagreement on consumption and billing minimum amount, it would automatically alert the customer.

Existing system

Governments are facing a lot of problem with the increase in demand for the electricity. Consumer wants to pay the electricity bill in a queue and may occur a electricity loss during of the electrical power supply. people are wasting the power in some other places for un usage at home ,office factory ,etc.. Electricity theft also occurring in all the places. so that Nowadays electricity consumers (mainly in industry) are asking for better customer service, high accuracy in energy measurement, good & healthy power supply and timely data. After emerging a rapid increase in digital technology and computer communication system we had seen a plenty of revolution to replace old system by new ones.

Disadvantages

Use high manual power
Loss of electricity power and cost.

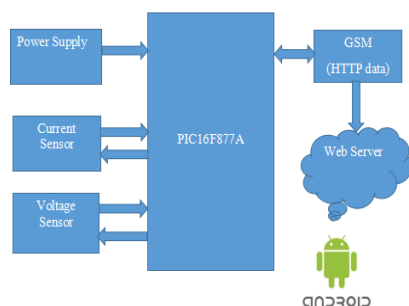
Proposed system

The main aim of the project is to minimize the queue at the electricity billing counters and to intimate the recharge amount (prepaid meter) automatically. The work system adopts totally a new concept of “prepaid electricity”. The IoT technology is used so that the consumer would receive messages about the consumption of power (in watts) and if it reaches the can be assembled by hand, and even the

recharge. This technology holds good for all the electricity distribution companies, private communities, IT parks and self-containing housing projects, The implementation of this project will help in better energy management, conservation of energy and also in doing away with the unnecessary hassles over incorrect building. It also plots live energy consumption curve monitoring using IoT. The automated prepaid billing system will keep track of the real time consumption and will leave little scope for disagreement on consumption and billing. so that, they will no longer have to deal with late payments or non-paying bill by the customers. And also help to reduce electricity theft.

Advantages

- Reduce cost and electricity power
- Balance becomes Easy and accuracy



Module Description

1. Arduino microcontroller

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button and turn it into an output - activating a motor, turning on an LED, publishing something online. Arduino boards are relatively inexpensive compared to other microcontroller platforms. The least expensive version of the Arduino module

Few simple steps to start controlling your world through the internet. As always with Arduino, every element of the platform – hardware, software and documentation – is freely available and open-source

pre-assembled Arduino modules cost less than \$50. Open source and extensible hardware The plans of the Arduino boards are published under a Creative Commons license, so experienced circuit designers can make their own version of the module, extending it and improving it. Even relatively inexperienced users can build the breadboard version of the module in order to understand the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications. In the Internet of things context (IoT), on the Arduino side, we simply need to connect the led to Arduino main board and control it using one of the Arduino output. The most complex part is creating a Web server that handles HTTP request. The image below shows how Arduino is connected to the led. The idea is that the Smartphone sends an HTTP request to the Arduino. A very small and simple Web server runs on Arduino, accepting HTTP request. For simplicity, the app sends energy data that holds the led.

2. Arduino interfacing with web server using WIFI

Connect the components as shown above. Arduino's pin 8 is connected to the pushbutton and is configured as INPUT. When the button is pushed, the Arduino will read a LOW value on this pin. The Arduino will then set the status of the OUTPUT to ON. When it is released, the output will be set to OFF. The status of the switch will be sent to the Web server. The Arduino Wifi Shield connects your Arduino to the internet in mere minutes. Just plug this module onto your Arduino Board, connect it to your network with an RJ45 cable (not included) and follow a ouself..

```
byte mac[] = { 0x90, 0xA2, 0xDA, 0x0D, 0x85, 0xD9 };
```

You can set the subnet and gateway with the

Hundreds of thousands of Arduino Boards are already fueling people's creativity all over the world, everyday. Operating voltage 5V (supplied from the Arduino Board)

3. WIFI configuration

To control the Ethernet shield, you use the Wifi.h library. shield must be assigned a MAC and IP address using the Wifi.begin() function. For a particular device, a MAC address is a globally unique identifier. Current Ethernet shields come with a sticker indicating the MAC address. For older shields, a random one should work, but one should not use the same one for many boards. Validity of IP addresses depends on the configuration of one's network. If DHCP is used, it may dynamically assign an IP to the shield.

3.1 IP address

IP address (Internet Protocol address) is a numerical label assigned to each device participating in a computer network that uses the Internet Protocol for communication. Specifying the IP address is done by writing the line: `byte ip[] = { 192, 168, 0, 112 };` and change it to match one own setup. For example, to assign the IP of Ethernet shield to 192.168.0.50, write the line: `byte`

`ip[] = { 192, 168, 0, 50 };`

3.2 MAC address

MAC address (media access control address) is a unique identifier assigned to each device participating in a physical network. Each piece of networking equipment has a unique serial number to identify itself over a network and this is normal hard-programmed into the equipment's firmware. However, with Arduino, we can define the MAC address complexity avoids the re-encoding of data.

```
function ScsSerialize( x_params )
```

```
{
var ret = ";
```

help of following commands

```
byte subnet[] = { 255, 255, 255, 0 };
```

```
//assigning subnet mask
```

```
byte gateway[] = { 192, 168, 0, 1 };
```

```
//assigning gateway
```

4.4 Passing variables in a URL

URL Variables make for a quick method for pre-populating existing data into a survey. With a simple query added to the end of the survey link, data can be stored as part of each survey response. This gives you the ability to push information into the survey through your survey link to store for use within the survey and/or to use when reporting on the survey response.

Integrate with panel companies or other third parties (pass unique IDs into and out of the survey, along with response statuses such as terminate, over quota, and complete) repopulate data in the survey that is either visible or invisible to the survey respondent (pass the name of a customer service representative or a ticket number into a survey).drive survey logic (show or hide pages and questions based on different variables) pass information between surveys (pass a unique identifier in order to connect responses to individuals across surveys) perform a unique function (only allow one response per value, go to the beginning of a response, or go to a specific page).

4.4.1. Parsing

As mentioned, the big pro here is that this can be easily parsed. Here is an example PHP implementation. You'll notice that the encoding function is similar in complexity to the above runaway example; however, the decoding function is more complex. This extra

4.5 LCD

A liquid crystal display (LCD) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs do not emit light directly. They are used in a wide range of applications

```

for ( var key in x_params )
{
if ( key && x_params[ key ] )
{
// Continue link
if ( ret ) ret += ',';

// Save the key
ret += escape( key );
if( x_params[ key ].constructor ==
Array ||

x_params[ key ].constructor ==
Object )

{

ret += '{' + ScsSerialize(
x_params[ key ] ) + '}';

}

else ret += '=' + escape(
x_params[ key ] );

} // end if

}

return ret;
}

```

programmable current sources, etc. One of the simplest techniques of sensing current is to place a small value resistance (also known as Shunt resistor) in between the load and the ground and measure the voltage drop across it, which in fact, is proportional to the current flowing through it. Whereas this technique is easy and straightforward to implement, it may not be very precise because the value of the shunt resistor slightly varies with its

including: computer monitors, television, instrument panels, aircraft cockpit displays, signage, etc. They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones. LCDs have displaced cathode ray tube (CRT) displays in most applications. They are usually more compact, lightweight, portable, less expensive, more reliable, and easier on the eyes. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they cannot suffer image burn-in. LCDs are more energy efficient and offer safer disposal than CRTs. It is an electronically-modulated optical device made up of any number of pixels filled with liquid crystals



and arrayed in front of a light source (backlight) or reflector to produce images in colour or monochrome. The earliest discovery leading to the development of LCD technology, the discovery of liquid crystals, dates from 1888. By 2008, worldwide sales of televisions with LCD screens had surpassed the sale of CRT units

4.6 CURRENT SENSOR

Sensing and controlling current flow is a fundamental requirement in a wide variety of applications including, over-current protection circuits, battery chargers, switching mode power supplies, digital watt meters, receiving the current consumed for calculation total power consumed for each appliance. The total power consumption of the appliances based on current drawn from the appliances against time. The complete hardware prototype of IoT based Energy Management system developed employing Arduino as microcontroller and processing unit. In addition current and voltage Sensors deployed and same

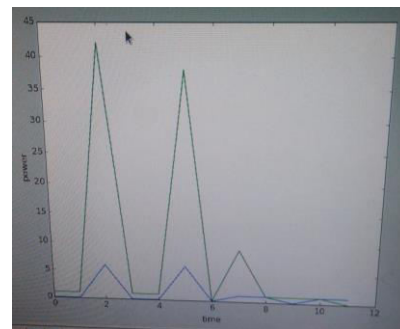
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temperature, which in fact is not constant because of the Joule heating. Besides, this simple technique does not provide isolation between the load and current sensing unit, which is desirable in applications involving high voltage loads. Today, we will talk about Allegro ACS712 device which provides an economical and precise way of sensing AC and DC currents based on Hall-effect. This discussion is divided into two parts. The first part will provide a brief overview of the ACS712 sensor and its characteristics. In the second part, a test experiment will be carried out to interface the sensor with a PIC microcontroller to measure a dc current.

Experimental results and discussion

The complete hardware prototype of IoT based Energy Management system developed employing Arduino as microcontroller and processing unit. In addition current and voltage Sensors deployed and same connected to Arduino microcontroller. Also the Arduino unit connected using Wi-Fi Module to Pi3 for communication of current drawn from each appliance for computing total power consumed and same plotted as graph. The results been updated as HTML Webpage in server. The complete IoT based Energy Management System Prototype with all sensors and connection. The Arduino Environment of controlling the appliances environment where PHP code written for time. off by a relay. This reduces human labour and at the same time increases the efficiency in calculation of bills for used electricity. Smart energy meters will bring a solution of creating awareness on unnecessary wastage of power and will tend to reduce wastage of power. This module will reduce the burden of energy providing by establishing the connection easily and no theft of power will take place. This paper work exposes the purpose of energy monitoring and controlling by implementing prepaid system. It is hoped that this work

connected to Arduino microcontroller. Also the Arduino unit connected using Wi-Fi Module to Pi3 for communication of current drawn from each appliance for computing total power consumed and same plotted as graph. The results been updated as HTML Webpage in server. The complete IoT based Energy Management System Prototype with all sensors and connection. The Arduino Environment of controlling the appliances environment where PHP code written for receiving the current consumed for calculation total power consumed for each appliance. The total power consumption of the appliances based on current drawn from the appliances against



Conclusion

The design of Smart Energy meter using GSM technology can make the users to pay for the electricity before its consumption. In this way, consumers hold credit and then use the electricity until the credit is exhausted. If the available credit is exhausted then the electricity supply is cut- an RFID tag. An RFID tag is an object that can be applied to or incorporated into a product, animal, or person for the purpose of i technology requires some extent of using. management and its utility in the distribution system for economic liability of the Electrical Boards

Future Scope

RFID BASED PREPAID ENERGY METER BASIC IDEA: A scheme of Electricity billing system called "PREPAID ENERGY METER WITH TARIFF INDICATOR" can facilitate in improved cash flow management in energy utilities and can reduce problem associated with billing consumer living in isolated area and reduce deployment of manpower for taking meter readings. Every consumer can recharge RFID tag assigned and recharge its meter at various ranges (i.e. Rs 50, Rs 100, Rs 200 etc.). In our project and implementation we have given the name for RFID tag card smartcard. Consumer can check its balance in LCD attached with the module and be prepared for the next recharge in advance. Radio-frequency identification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders. The technology requires some extent of cooperation of an RFID reader and cooperation of an RFID reader and an RFID tag. An RFID tag is an object that can be applied to or incorporated into a product, animal, or person for the purpose of identification and tracking radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader. An RFID tag is an object that can be applied to or incorporated into a product, animal, or person for the purpose of identification and tracking using radio waves.

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