Automatic Energy Meter Billing

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Abstract

The present system of energy charge in India is error prone and conjointly time and labour intense. Errors get introduced at each stage of energy charge like human errors whereas noting down the meter reading and error whereas process the paid bills and therefore the due bills. There area unit several cases wherever the bill is paid so is shown as a due quantity within the next bill. Nowadays that every one energy meter scaning is read by manually that's, Geb person should return and he should scan the reading of energy meter and he can offer the bill for that therein bill he are giving a final date to pay the bill, if the client way pay the bill among a given last date other than keb person should return and he can take away the fuse and he can go. Some folks can plug the fuse once removing the fuse by Geb. Some can take away the seal of energy meter. And altogether cities is tough to modify ON and OFF the road lights throughout evening and already dark. As a result of there ought to be a person power. The lights area unit controlled manually. The Geb person should go every space and switch ON/OFF at explicit time. And it's tedious job to try to to this work. If that person didn't return then the road are ON 24hrs. There's waste of electricity. And within the already dark at 11pm on top of there's a no use of street lights, there the electricity is wasting. Automatic Meter Reading system (AMR) incessantly monitors the energy meter and sends information for the asking of service supplier through SMS. Automatic meter reading system helps the client and energy service supplier to access the correct and updated information from the energy meter. this technique utilizes the worldwide system for mobile communication (GSM) network to send its power usage reading victimization Short electronic communication Service (SMS) back to the energy supplier wirelessly. The interface conjointly consists of LCD that displays the number of power consumed. As a result this helps to attach to remote areas because it employs wireless technology. This technique not solely reduces the labor price however conjointly increase meter reading accuracy and save huge quantity of your time.

Keyword: **GSM, Energy meter**

INTRODUCTION

Electrical power has become indispensable to human survival and progress. Apart from efforts to meet growing demand, automation in the energy distribution is also necessary to enhance peoples life standard. Electricity is the crucial requirement for leading a comfortable life. It is to be properly used and managed. No proper planning of power distribution is leading to tariff calculation problems. Many statistical errors prevail in monthly customer billing process[3].

From the first days until these days meter reading for electricity consumption and asking is finished by human operators from homes to homes. This so needs a really sizable amount of human operators and long operating hours to accumulate complete information reading and asking in a very explicit space. However, there is also cases wherever human operators miss to bill few homes in a region or restricted and caught up by atmospheric condition condition, transportation issues, etc. Furthermore human operators are abundantly seemingly to form mistake

whereas asking or reading a meter and generally the homes electrical power meter is also placed in a very location wherever it's not simply accessible. To realize economical meter reading, scale back asking error and operation prices, associate degree Automatic power meter reading system is introduced with each energy meter. It's a good means that of knowledge assortment that permit substantial saving through the reduction of meter re-read, larger information accuracy, frequent reading, improved asking and client service, a lot of energy issues and consumption trends updates and higher preparation of human resource [4] .

The idea of wireless knowledge transmission to scale back the human dependency to gather the monthly reading and to reduce the technical issues relating to the charge method. This helps in sizable reduction of power thefts still to calculate average power consumption of specific neighbourhood. Energy meter reading exploitation GSM implements the rising applications of the GSM technology. GSM could be an international system for mobile communication (GSM) and could be a wide space wireless communications system that uses digital radio transmission to produce voice, data, and transmission communication services. A GSM system coordinates the communication between mobile telephones (mobile stations), base stations (cell sites), and switch systems. The GSM system includes mobile telephones (mobile stations), radio towers (base stations), and interconnection switch systems[1]. The message area unit sent from the mobile set that contain commands in written kind that area unit

then processed consequently to perform the desired task. The planned approach for planning this technique is to implement microcontroller based mostly management module that receives its directions and command from a cell phone over the GSM network. The microcontroller then can perform the issued [2].

Automatic meter reading, or AMR, is that the technology of mechanically collection consumption, diagnostic, and standing knowledge from meter or energy metering devices (gas, electric) and transferring that knowledge to a central information for asking, troubleshooting, and analyzing. This technology principally saves utility suppliers the expense of periodic journeys to every physical location to scan a meter. Another advantage is that asking is supported close to period consumption instead of on estimates supported past or foreseen consumption. This timely data as well as analysis will facilitate each utility suppliers and customer's higher management the utilization and production of electrical energy, gas usage, or water consumption. AMR technologies embody hand- control, mobile and network technologies supported telecom platforms (wired and wireless), frequence (RF), or power cable transmission. It's a method of digitally noting the energy meter readings. This method eliminates the standard paper and pen and therefore the errors related to manual reading/ recording/ process of the meter knowledge. Automatic Meter reading conjointly makes the information recording quick and saves on time and thence complies with the definition of automation [5].

PREMILINARY DESIGN

Approaches	Constraints	Advantages	Conclusion
Smart card based billing system	High initial installation cost	Better customer service.	Control is limited and not affordable for everyone.
Electrochemical meter	Accuracy is less Poor theft detection	Nil	Its need to be improved with so as to make it efficient.

Fig 1.1: *Alternative design*

Approaches	Constraints	Advantages	Conclusion
IR based billing system	• More costly • Lots of disturbance when distance is more.	• Wireless billing system. • Improved security.	It is costly thus it is not preferred.
Using AMR (AUTOMATIC METER READING TECHNOLOGY)	Users must be familiar with basic usage.	• Highly convenient • Tampering detection which reduces the scope for malpractices. • Improved billing.	It is user-friendly but it requires advanced wireless technology. It has high accuracy.

Fig 1.2: *Alternative design*

BLOCK DIAGRAM
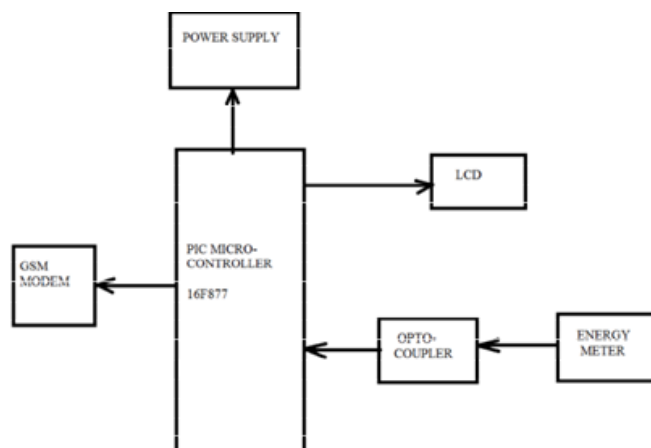
Power Supply

A DC power supply system, which maintains constant voltage irrespective of fluctuations in the main supply or variation in the load, is known as Regulated Power supply.

Microcontroller

The program stored in microcontroller will perform the controlling actions as per the program stored in ROM and sensing is done with the help of input port of PIC 16F877A. The Microcontroller receives the control signal from input port and the microcontroller operates the hardware as per program.

LCD Display

LCD Display is a 16*2 which has 2 rows and 16 columns is used to display the unit and cost of the energy meter.

GSM Modem

GSM/GPRS good electronic equipment could be a multi-functional, able to use, rugged unit that may be embedded or obstructed into any application. The good electronic equipment may be controlled and customised to numerous levels by victimization the quality AT commands. The electronic equipment is absolutely type approved, it will speed up the operational time with full vary of Voice, Data, Fax and Short Messages (Point to purpose and Cell Broadcast), Designed for world market, SIM300 Tri-band GSM/GPRS engine that works on frequencies 900 megahertz, 1800 megahertz and 1900 megahertz.

MAX 232 Circuit

The MAX232 contains the necessary drivers and receivers, to adapt the RS-232 signal voltage levels to TTL logic. It needs one voltage
(+5V) and generates the necessary RS-232 voltage levels (approx. 10V and +10V) internally. This greatly simplies the design of circuitry.

Optocoupler

It is a component that transfers electrical signals between two isolated circuits by using light.Optocouplers prevent high voltages from affecting the system receiving the signal[2].

Energy Meter

An electricity meter, meter, or energy meter could be a device that measures the quantity of electrical energy consumed by a residence, business or associate degree electrically steam-powered device. Electrical utility use electrical meters put in at client premises to live electrical energy delivered to their client for request purpose. They're usually caliberated in request units, the foremost common one being the power unit hour[kWh]. They're typically scan once victimization request amount [1].
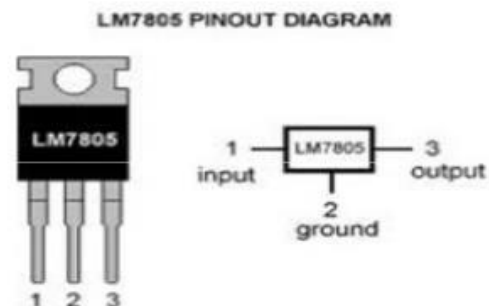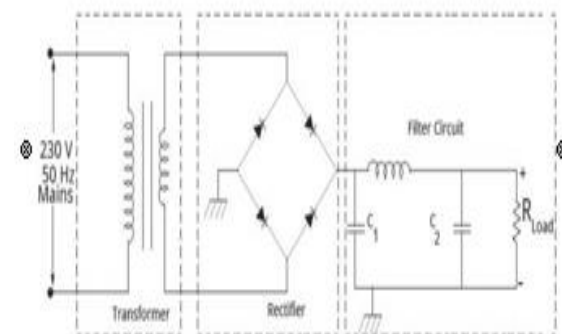

Fig 3: Voltage Regulator

Features

a) Output current in excess of 1A.
b) Internal thermal overload protection.

c) No external components required.
d) Output transistor safe area protection.
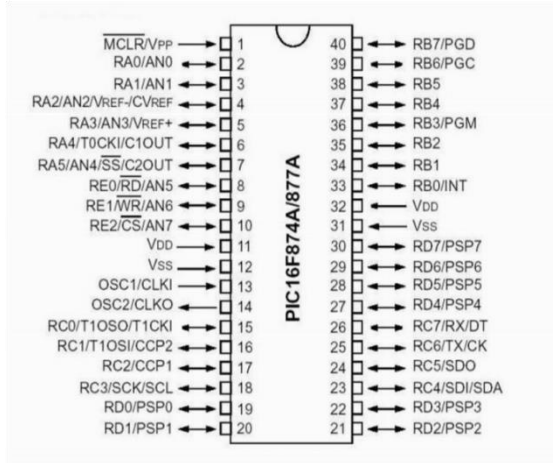e) Internal short circuit current limit[7].
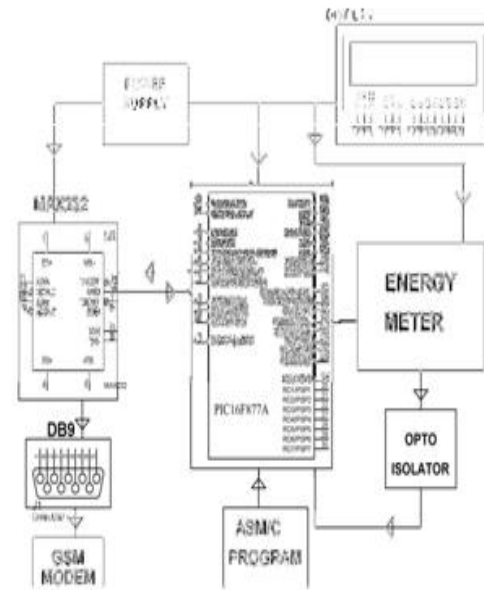

Fig 4: *Pin diagram*

LIQUID CRYSTAL DEVICE

LCD screen is an electronic display module and a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special even custom characters (unlike seven segments), animations and so on[6].

Pin No	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	Vcc
3	Contrast adjustment; through a variable resistor	V_{EE}
4	Selects command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7		DB0
8		DB1
9		DB2
10		DB3
11	8-bit data pins	DB4
12		DB5
13		DB6
14		DB7
15	Backlight V_{CC} (5V)	Led+
16	Backlight Ground (0V)	Led-

Fig 5: *LCD Pin Diagram*

Fig 6: *Detailed Block Diagram*

RESULT AND DISCUSSION

Prototype

An optocoupler is used to read the pulses from the energy meter. The output of the optocoupler

Fig. 7: *Prototype*

CONCLUSION AND FUTURE WORK

There is plenty of wastage of power attributable to inefficient consumption of electricity by customers. The distribution company, most of the time, should receive huge amounts attributable to unfinished bills which ends up in substantial revenue losses and conjointly causes hurdles to modernization attributable to lack of funds. The patron, on the opposite hand, is facing issues like receiving due bills for bills that have already been paid and poor reliableness of electricity provide. The remedy for of these issues is to stay track of the customers load on a timely basis, which can facilitate assure correct request,

track most demand, and find on-line stealing. These area unit all the options to be taken under consideration for planning an economical energy request system.

In future we will conjointly update the tariff within the energy meter by writing a program within the java and it should be connected to the energy meter exploitation USB port that mechanically updates the program within the small controller. And that we should conjointly build straightforward to the purchasers for getting the watts exploitation SMS request. This makes exible for each user and therefore the company.

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