

# Prepaid Energy Meter For Power Control And Billing System

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## ABSTRACT

The aim of this project is to minimize the queue at the electricity billing counters as well as to restrict the usage of electricity automatically, if the bill is not paid on proper time. This project also aims at proposing a system that will reduce the loss of power. In order to avoid waste of money in this system we have used gsm sms based billing process. The Consumer has to pay the bill in time, if couldn't, the power connection may be disconnected automatically from the remote server. It displays the corresponding billing information on LCD and data is sent to the server. The microcontroller based hardware system consists of a processor core board and the peripheral board. This system provides efficient meter reading, avoiding the billing error and reduces the maintenance cost. It will provide pure transparency in the system.

**Keywords—** GSM, LCD, Arduino Mega 2560 Controller, Energy Meter, Easy EDA software, Arduino IDE.

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## I. INTRODUCTION

The implementation of smart energy meter (prepaid) project will help in betterment of energy management, conservation of energy and also in doing away with the unnecessary hassles over incorrect billing. The automated billing system of smart energy meter will keep track of the real time consumption. The Power Supply section supplies all other components with required Power. The microcontroller module takes the data from the energy meter and performs the necessary control operations like breaking the circuit through Relay control unit and the required information to the mobile phone via the communication module [2] GSM. Whenever a request is obtained by the user to the controller and the data has been sent the DC buzzer gives a beep sound as an indication that a request has obtained and sends the data to the user. The traditional manual Meter Reading was not suitable

for longer operating purposes as it spends much human and material resource. It brings additional problems in calculation of readings and billing manually. Maintenance of the power is also an important task as the human operator goes to the consumer's house and produces the bill as per the meter reading. If the consumer is not available, the billing process will be pending and human operator again needs to revisit. Going to each and every consumer's house and generating the bill is a laborious task and requires lot of time. It becomes very difficult. It would automatically alert the consumer to recharge for further usage.

The block diagram is explained in hardware design chapter. Software which we have used are explained in brief in software design chapter. We have referred 10 IEEE research papers which have been explained in literature survey in tabular form. The Report is concluded in conclusion.

## II. LITERATURE SURVEY

[1] In the year of march 2017 Giri Prasad , Akesh, BalaPravin, Gokila Devi, Gowri Devi presented a paper titled “IoT BASED ENERGY METER”. This paper represents energy meter measures the amount of power consumed and uploads it to cloud, from which the concerned person can view the reading. The power reading is sent to cloud using ESP 8266, a Wi-Fi module. The power reading from digital wattmeter is read using the optocoupler and transmitted digitally to the Arduino. So it automates the process of measuring the power consumption at homes using IoT

[2] In the year of April 2018 Mrs. Anusha M N, Mrs. Kokila K S, Niveditha G J ,Poornima K S,Ranjana B R ,Rashmi A J presented a paper titled” SYNCRETIC USE OF SMART METER FOR POWER QUALITY MONITERING AND ENERGY MANAGEMENT IN EMERGING NETWORKS”. This paper represents The energy Meter proposed here deals with the measurement of current, voltage and consumption of power. GSM is used to send a message to a domestic user with information on billing. They used PIC microcontroller and SMS system for user in this system. distributor can cut off and reconnect the connection of energy via SMS.

[3] In the year of March 2019 Gopal, Devendra Kumar Pandey, Brijesh Kumar Dubey presented a paper titled” PREPAID ENERGY METER WITH GSM TECHNOLOGY”. This paper represents the work system adopts a totally new concept of “Prepaid Electricity”. The Global System for Mobile (GSM) 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 consumer to recharge for further usage . This technology helps in holding the good for all electricity distribution companies, private communities, IT parks and self-containing housing projects. The implementation of smart energy meter(prepaid) project will help in betterment of energy management, conservation of energy and also in doing away with the unnecessary hassles over incorrect billing

[4] [4] In the year of April 2015 Myilsamy K. presented a paper titled” Automated wireless meter reading system for controlling power”. This paper represents the implementation of wireless

automatic electric meter (AMR) network, implementing based on Zigbee technology for reduced power consumption. Wireless Electric meter is used for the collection of unit count and it is evolved from traditional meter reading scheme and power theft from the transmission line. This wireless automatic reading technology saves human resources and improves the accuracy. Zigbee is used as communication protocol since the application don't need high speed data rate, need to be low powered and low cost.

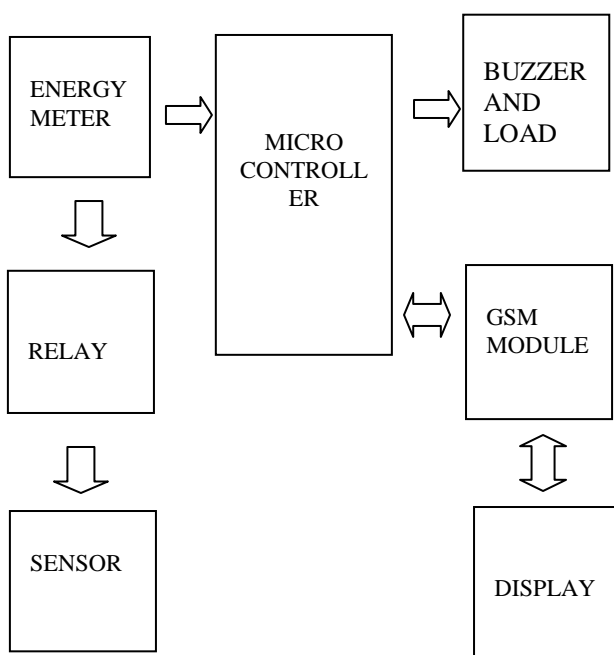
[5] In the year of march 2018 Saravanan R N, Padmanaban U, Santhosh Kumar M, Shankara Narayanan K presented a paper titled “IoT based smart energy meter”. This paper represents a new network communication system for energy meter reading by internet communication technology and software system along with the existing meters. each customer is differentiated using address or Id, this ID are used for identification by the consumer and as well as by office to monitor the reading and payment detail. It is secured by any network standards. Energy meter deliver the reading details and it is uploaded on the website instantly.it contains current sensor, voltage sensor, Arduino UNO, an LCD Display, IOT Modem and a pair of relays

TABLE I

YE AR	Summary Of Literature Survey:(Tabular Form)		
	Name Of Paper	Methodo ogy	Remarks
2018 APR MAY	“SYNCHRETI C USE OF SMART METER FOR POWER ENERGY MANAGEME NT”	GSM AND SMS BASED , PIC CONTR OLLER	MINIMIZ E THEFT ,POWER CONSUM PTION,
2019 APR	“PREPAID ENERGY METER WITH GSM”	ATMEL8 9S52,SM ART CARD USE,	COMPARI SON BETWEE N CARD CREDIT AND METER INFO

2015 MAR	"AUTOMETE D WIRELESS METER READING SYSTEM CONTOLLIN G POWER CONSUMPTI ON"	ZIGBEE TECHNO LOGY,A DCSEPA RATE,	SHORT RANGE COMMUN ICATION, EASY RELIABL E.
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### III. BLOCK DIAGRAM



### IV. WORKING

**EEPROM:** When we power up the system then it reads previous values of rupees stored in EEPROM and restores them into the variables

**ARDUINO CONTROLLER:** Arduino turns On the electricity of home or office by using relay. And if balance is less than 15 rupees then Arduino sends a SMS to user phone regarding low balance alert and requesting to recharge soon. And if balance is less than 5 rupees then Arudino turns Off the electricity connection of home and sends a SMS to user's phone for 'Light Cut' alert and requesting to recharge soon.

**GSM module:** GSM module has been used to send and receive messages Now when we need to recharge our system, we can recharge it simply by sending a SMS to the system, through our

Cellphone. Like if we want to recharge by 45 bucks then we will send #45\*, here # and \* are prefix and suffix to the recharge amount. System receives this message and extract recharge amount and update the balance of system. And system again turns On the electricity of the house or office.

**DISPLAY:** It will display the consumed power in unit and remaining power in units.

**Energy meter:** single phase energy meter is being used in this system .which is connected to relay driver ic and current sensor

**Buzzer and load:** 60watt bulb will be there which will turn on /off after recharge .

**Sensor:** current sensor will sense the current and it is connected to relay and power supply.

DEV ICE	AVAILABL E DEVICES	SELEC TED DEVIC ES	SPECIFICATION
CO NTR OLL ER	ARM PIC ARDUINO	CONT ROLL ER: ARDU INO 2560	256KB FLASH,8KB DATA MEMORY,16mHZ CLOCK SPEED
SEN SOR	ACS 712 30A ACS 712 20A	CURR ENT SENS OR ACS71 2	Measures both AC and DC current Provides isolation from the load Easy to integrate
GS M MO DUL E	SIM 800 SIM 900	Sim 900 gsm module	The Modem is designed with 3V3 and 5V DC interfacing circuitry, allows User to directly interface with 5V Microcontrollers (PIC, AVR, Arduino, 8051 etc.)
DRI VER IC	ULN 2002A ULN2003A	Uln200 3 A	Logic control voltage:3~5.5V Motor Supply Voltage: 5~15V It can sink 500mA from a 50V supply,but you'd better limit the driver voltage under 15v. Operating temperature: -25 degree Celsius ~ +90 degree Celsius

### V. CONCLUSION

We will be able to build an enhanced system for the electricity billing using gsm technology. This system will set up an apt communication system between user and meter using gsm and confirm their recharge through gsm. On successful

implementation, this system can also turn out to be boon for MSEB.

## REFERENCES

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[2] R.Asha<sup>1</sup>, R.Aruna<sup>2</sup>, J.Divya<sup>3</sup>, K.Balasaranya<sup>4</sup>  
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Easwari Engineering College, Chennai, Tamil Nadu

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