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## PREPAID ENERGY METER BILLING SYSTEM USING ARM PROCESSOR USING RECHARGE CARDS

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### ABSTRACT:

Now a days, most of the people find very difficult to pay electricity bill (EB).Energy consumed by the subscriber are not accurately measured through the manual method and leads to loss to the EB department. The existing system reduces the manual work and easy payment of the bill through the internet. Internet payment is expected to some connectivity problem leads to non-payment of the EB charge disconnection of the supply. The proposed system introduces a prepaid card as like a mobile recharge card. The card will hold the total amount of energy that are required by the consumer. The card is used to charge the system and the customer able to use up to the limit. Once the card limit crossover 50% of the amount a warning bell and an SMS is sent to the user to recharge the meter. The proposed system reduces the man work and leads to high accuracy and save power loss and also reduces the power theft.

### I. INTRODUCTION

The present traditional billing system have many problems like problem of payment collection, energy thefts etc. due to which the traditional billing system is slow, costly and unreliable. The present billing system has chances of error and it is also time or labour consuming. A paper suggests a design of digital energy meter for improved metering and billing system. Poly-phase prepaid energy metering system has also been proposed and developed based on local prepayment and card reader. Another paper suggests prepaid energy meter using a microcontroller from microchip technology Inc PIC family, used due to low cost of microcontrollers.

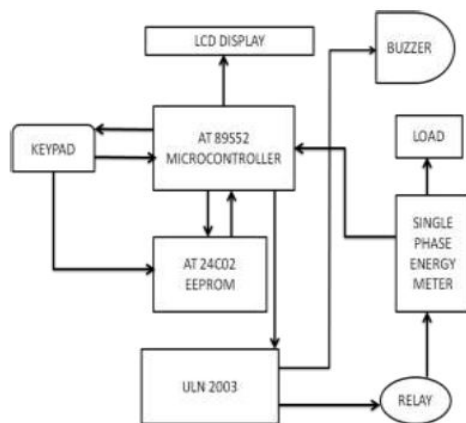
So it is essential to develop a billing system which solves the problem of billing manually and also reduces the manpower.

In this paper we proposed and designed a prepaid energy meter using ARM. The reason for using these microcontrollers is its high performance, power efficiency or design flexibility etc. In this paper, a recharge card is used which is available in various ranges and the energy meter to which the no. of recharge units has to be loaded. Suppose a consumer buys a recharge card for Rs. 50 he/she can insert this amount through the keypad so that the prepaid energy meter will be activated. According to the power consumption the amount will be reduced. An LDR circuit is used to count the amount of energy consumed and an LCD is used to display the meter readings. When the recharge card amount is nil the relay will automatically shut down the whole system. In this project we also have provision to give an

alarm sound using buzzer to the consumer before the whole amount is depleted.

## II.EXISTED SYSTEM

The block diagram of prepaid energy meter is shown in fig. It consist of microcontroller AT89S52, buzzer, keypad, relay, single phase energy meter, IC AT24C02 which is an EEPROM and has volatile memory, IC ULN2003 is a high voltage/ high current Darlington array each contains seven open collector Darlington pairs with common emitters used to drive loads.

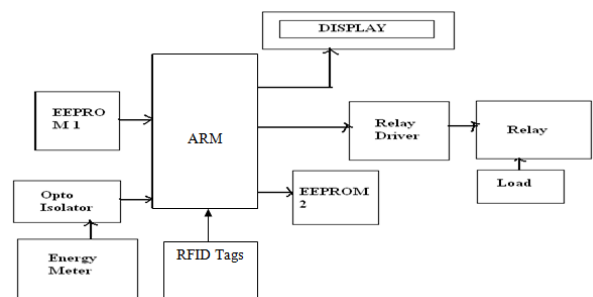


The recharge card is actually an EEPROM in which the balance amount along with the allocated energy units is stored. The Microcontroller reads the balance amount and stores it along with the tariff and the energy units allocated in its RAM and are programmed to delete off the information present in the EEPROM. The energy meter gives electric signal to the opto isolator which consists of an LED and an opto-transistor combination such that the LED glows and emits light for every electric signal received by the energy meter (which sends a electric signal for every unit consumed). The opto-transistor starts

conducting and sends high and low pulses to the microcontroller. The microcontroller is programmed such that a counter is kept incrementing for every pulse rate, which gives the value of the energy consumed.

Another EEPROM is interfaced to the microcontroller where the balanced amount and the energy units consumed are stored. For every increment in count, the balanced amount in this EEPROM is deducted. Finally when the balance amount is zero, the microcontroller sends a low signal to the Relay driver to give a high signal at its output, which switches off the relay. Normally the microcontroller gives a high signal to the input pin of the relay driver, which develops a logic low signal at its corresponding output pin and the relay coil is energized, thus connecting the load to the main supply.

## III.PROPOSED SYSTEM



The proposed system is designed with RFID R/W tag, RFID R/W reader, ARM, Driver circuit, Alarm, Keypad. RFID R/W is the special type wireless card which has inbuilt the embedded chip along with loop antenna. The inbuilt embedded chip represents the 12 digit

card number. In the R/W card we can read as well as write the information on the card. RFID R/W reader is the circuit which generates 125KHZ magnetic signal. This magnetic signal is transmitted by the loop antenna connected along with this circuit which is used to read and write the information on the RFID card.

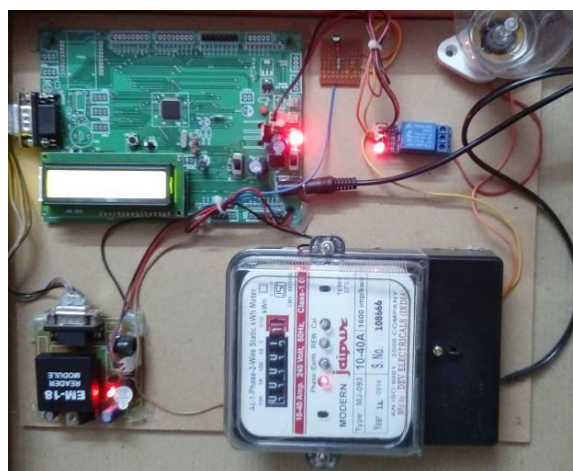
In this project RFID R/W card is used as prepaid card and charged with some amount of money like Rs.100 and Rs.500 etc. This prepaid card is inserting in the Energy meter. The consumed energy is measured by IR transmitter and receiver. Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other. Here the IR transmitter and receiver are placed in between the energy meter.

We put holes in the energy meter disc. Initially the IR transmitter passes the rays to receiver. Whenever the disk is rotating it cuts the IR rays between Transmitter and Receiver. So the corresponding signal is given to ARM through signal conditioning unit. So the inside the counter will increment the one value for each rotating. ARM will calculate the amount for each rotating and compare with RFID prepaid card amount. When the prepaid card amount is in the final ARM microcontroller activates the alarm through driver circuit. When prepaid card amount is completed ARM will activate the relay for tripping the incoming supply through driver circuit corresponding information will be displayed in the LCD display.

We can also recharge the RFID card for particular amount through keypad. If the RFID

R/W card is not valid, the ARM will display the “Authentication Fail “on the LCD display and also activate the driver circuit for alarm. So the alarm makes the sound for indicating the authentication fail. Whenever the disk is rotating it cuts the IR rays between Transmitter and Receiver. So the corresponding signal is given to ARM through signal conditioning unit. So the inside the counter will increment the one value for each rotating. ARM will calculate the amount for each rotating and compare with RFID prepaid card amount.

## IV.RESULTS



## V.CONCLUSION

The paper is intended to present an overview of prepaid energy meter, which can control the usage of electricity on consumer side to avoid wastage of power. Prepaid energy meter is a concept to minimize the Electricity theft with a cost efficient manner.

The users are not bound to pay excesses amount of money, users have to pay according to their requirement. It can reduce problems associated with billing consumers living in isolated area and reduce deployment of manpower for taking meter readings. .Prepaid energy meter is more reliable and user friendly. From all these we can conclude that if we

implement this prepaid energy meter then it can become more beneficial.

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