

Abstract of the invention:

Over the past few years, smart cards have achieved a growing acceptance as a powerful tool for security, identification, and authorization. Financial card issuers are moving to replace magnetic stripe cards with chip cards to reduce counterfeiting and fraud. The increasing computational power placed on the chip along with advances in cryptography has made the smart card a very powerful tool for identification. The advent of multi-application smart card operating systems for both contact and contact less applications has put smart cards on the edge of information technology. This paper features a smart card secure solution for a novel prepaid electricity system. The proposed system uses a microcontroller in addition to a power meter, providing efficient online control of the amount of electricity consumed by the user. The user will be notified if his credit balance goes below certain threshold.

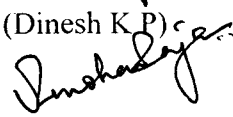
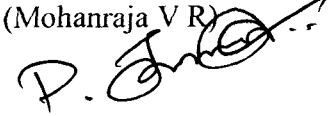
Claims

We claim

1. A Smart Card based Prepaid Electricity System comprising a microcontroller and a energy meter with an IR slot in it has the control over the novel prepaid electricity system providing indications to the user about the balance credit in the smart card.
2. As per claim 1, drilling of hole in the rotor disc and rotating it in between the IR slot for taking the interrupts to the system.
3. Use of ordinary microcontroller instead of IP based controller with no database server systems.
4. As per claim 1, indication of available balance in the smart card with different LED's i.e., yellow LED-sufficient balance, green LED with alarm- card has reached its threshold value and red LED- no balance and electricity will be cut-off.
5. As per claim 4, display of service message like please insert card i.e., when the card is removed from the reader the electricity will be cut-off and service message will be displayed in the LCD.
6. The rotation of rotor disc in between the IR slot is substantially as herein described and illustrated in the figure of the accompanying drawing.

Signature of Inventor(s)

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Dated this 2nd day of June 2014

6. DATE AND SIGNATURE

Veltech Dr RR&SR Technical University.	
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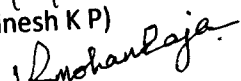
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FIG 1

Total No. of sheets: 2
Sheet No. 1

1. Rotor disc
2. IR slot
3. Microcontroller
4. Interrupt port
5. Smart card reader
6. Smart card
7. RS232 interface cable
8. Indication panel
9. LCD (Liquid Crystal Display)
10. Alarm
11. Red LED
12. Yellow LED
13. Green LED 13

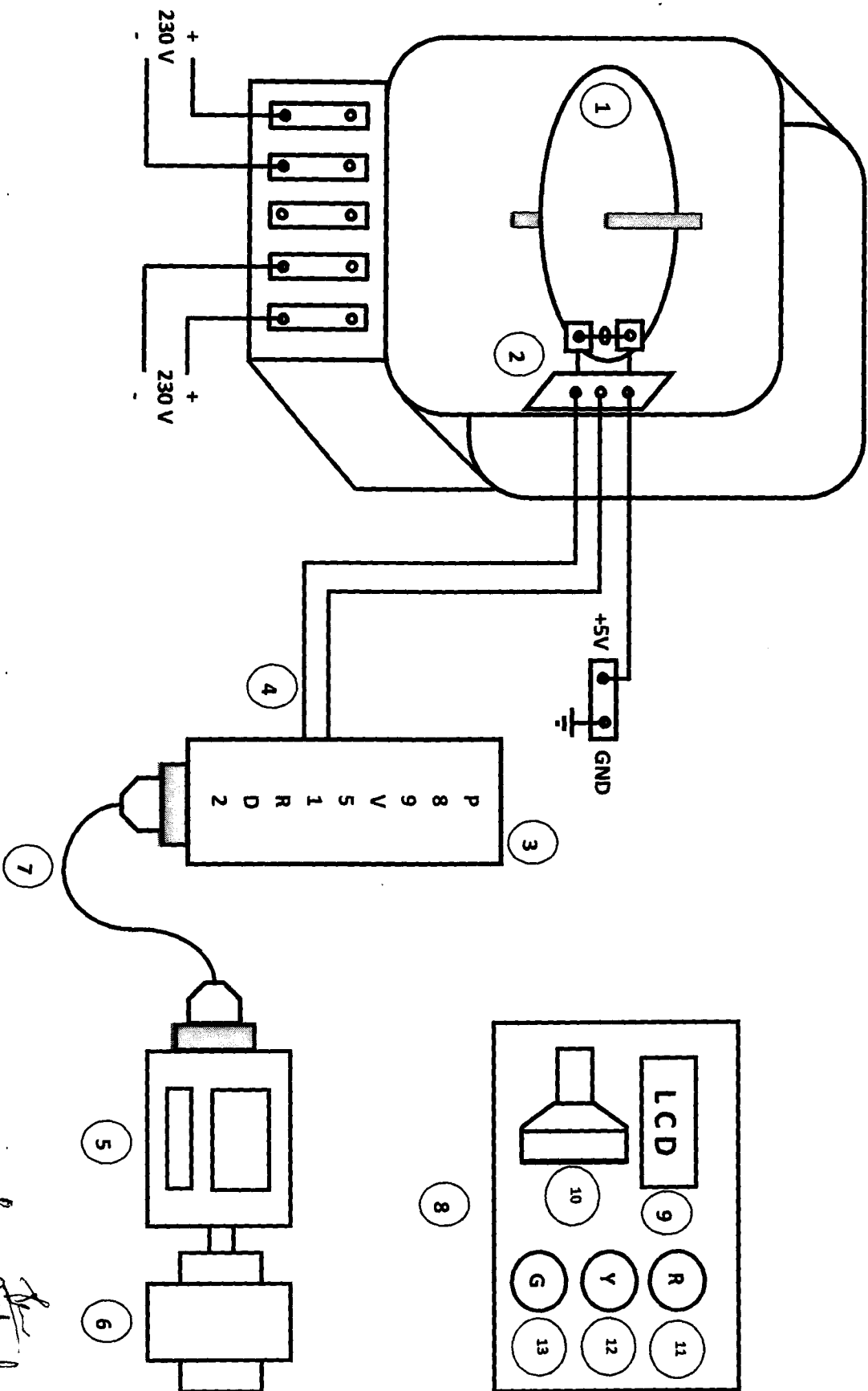
Signature of Inventor(s)
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FIGURE No: 1



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This has the feature of warning the user by sending SMS and email if his prepaid balance for consuming electricity is below a certain threshold before switching electricity OFF. The main drawback of this system is the use of IP based controller and indication of balance to the user through SMS and email.

Summary of the invention

The above mentioned problems are overcome by our invention which is done by using ordinary microcontroller with realistic indications to the user about his balance credit available in the card and consumed units. The balance in the card is decremented by the microcontroller when the interrupt is given to the system. When the balance credit in the card reaches its threshold value, indications are shown by glowing LED and giving alarm so that the user can credit his smart card before switching electricity OFF. Also the user can visually see the balance credit available in the card which is displayed in a LCD.

Brief description of the drawing

FIG.1

It is the model and mechanism of our project in accordance with our invention.

Referring to FIG.1 the link between the microcontroller 3 and smart card reader 5 is through a serial RS232 interface cable 7 for communicating between these devices. The microcontroller 3 is programmed to have an efficient control of the amount of electricity consumed by the user. The rotating rotor disc 1 in the energy meter is drilled with a hole. An IR slot 2, a combination of IR transmitter and receiver pair is fixed in the energy meter. The rotor disc 1 is rotated in between the IR slot. This IR slot is provided with a 5V power supply and it is connected to the interrupt port 4 of the microcontroller 3. Here when the hole in the rotor disc 1 passes through the IR slot 2 the system takes this as the interrupt. For particular number of interrupts the balance in the smart card 6 is reduced i.e., Rs. X/unit.

In the FIG.1 the indication panel 8 consists of a LCD (Liquid Crystal Display) 9, alarm 10 and three LED's i.e., red LED 11, yellow LED 12 and green LED 13. These indicators are used to give notification to the user about his balance details.

If the yellow LED 12 is ON, it indicates that there is sufficient balance in the smart card 6.

If the balance in the smart card 6 has reached its threshold value, there is switch over from yellow LED 12 to green LED 13 with alarm sound. This indicates that the user has to credit his balance in the smart card 6 before switching the electricity OFF.

If the balance in smart card 6 reaches zero, the red LED 11 will be ON indicating that there is no balance in the smart card 6 and the electricity to the home will be cut-off.

The LCD 9 screen shows the available balance in the smart card 6, consumed units by the user and some service messages like nil balance, please insert card etc.

Description

The mechanism comprises of the energy meter which is the standard element in all the electricity systems. The rotating rotor disc in the energy meter is drilled with a hole.

An IR slot which is a combination of IR transmitter and receiver pair is fixed in the energy meter such that the rotor disc rotates in between the IR transmitter and receiver pair.

A smart card reader is used to read the smart card. This card acts as a access control for a secure login to the system and also reads the available balance in the card.

When the hole in the rotor disc passes through the IR slot, the signal passes from transmitter to receiver of the slot. This is taken as the interrupt to the system.

The microcontroller is programmed such that when the interrupt is given the system, the balance in the card will be decremented by Rs. X per unit. The remaining balance will be displayed in the LCD screen.

Indications about the balance in the card are indicated to the user by glowing LED's, giving alarm and displaying message in the LCD.