

## **A Smart card based Prepaid Electricity System**

The purpose of this project is to design and develop an intelligent energy metering system that can efficiently control the amount of electricity consumed by the user. Electricity users can buy specific amount of energy to use it only when they needed. This is achieved by interfacing energy meter with smart card technology.

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. This project features a smart card secure solution for a novel prepaid electricity system. The proposed system uses a controller in addition to a power meter, providing efficient control of the amount of electricity consumed by the user.

Since the last decades of the past century, scientists and researchers have been worried about energy conservation. People spend much more power than what they actually need and that results in a huge loss of energy. Moreover, the continuous increase in the universal energy prices has resulted in a huge economical loss. Thus we are proposing a prepaid electricity smart card based system so people can buy specific amount of energy to use it only when they need. The purpose of this project is to reduce the power bill defaulter using smart card technology.

Smart card based prepaid electricity is a unique and new concept which saves lot of time and power for electricity department. User can recharge the card whenever the power is required. People now can buy electricity in advance, using the so-called prepaid electricity cards in the form of smart cards. The proposed prepaid smart card can also be used to manage electricity consumption in a hotel room. Thus, people can consume only as much power as they really need.

The project consists of a microcontroller, energy meter, relay, buzzer, LCD, Keypad and LED indicators. The microcontrollers internal non-volatile memory is used to store the electricity consumed. The nonvolatile memory inside the Smartcard is used to store the prepaid amount. When the recharged units become zero on power consumption, the microcontroller put off all the loads connected to it by giving an audible beep sound. User has to recharge the same Smartcard for further usage of electricity.

**The main objectives of the project are:**

1. Energy conservation.
2. User can recharge number of unit's required (prepaid system).
3. Lots of time and power saving for electricity department.
4. Automatic controlling of energy meter.
5. Non-volatile memory based energy meter storage.

**The project provides the following learning's:**

1. Smart card technology.
2. Interfacing Smart card reader to Microcontroller.
3. Relay working principle.
4. LCD displays.
5. Buzzer working.
6. Embedded C language.
7. Energy meter interfacing to Microcontroller.

**The major building blocks of this project are:**

1. Regulated Power supply.
2. Microcontroller.
3. Smartcard Reader.
4. Smart card.
5. Digital Energy Meter.
6. Optocoupler.
7. Keypad.
8. Crystal oscillator.
9. Electromagnetic Relay with driver.
10. LCD Display with driver.
11. LED indicators.
12. Buzzer with driver.

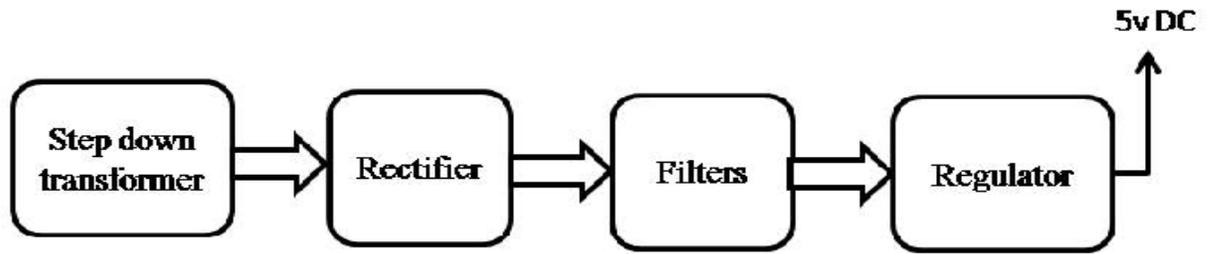
#### **Applications:**

1. Household electrical systems.
2. Hotels and short term residential houses.
3. Industrial power consumers.
4. Shared meter systems.

#### **Software's used:**

1. PIC-C compiler for Embedded C programming.
2. PIC kit 2 programmer for dumping code into Micro controller.
3. Express SCH for Circuit design.
4. Proteus for hardware simulation.

#### **Regulated Power Supply:**



Block Diagram:



### A Smart card based Prepaid Electricity system

