

ELECTRICAL POWER CONSUMPTION CONTROLLED USING ARDUINO AND GSM

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Abstract: The core of this project is to develop a system which will make a step for the energy conservation. Energy conservation refers to reducing of energy consumption with providing sufficient of an energy service. The security system which is used on the main entrance gate, for the visual presentation of system a prototype of the apartment is made. The controller employed in the system is **Arduino Uno**. The interfacing of the system with arduino is very much easy and works successfully. Arduino increases the responsiveness of the system. Arduino microcontroller to take necessary actions like switching OFF and ON electrical supply mains. The main objective of this system is to control the use of excessive power consumption above the restriction and provide the security to the system by using the Global System for Mobile Communication (GSM) technology.

Keywords: Arduino Uno, GSM, Relay, Current sensors.

1. INTRODUCTION

The Electricity theft is a very common problem in country, where population is very high. In India, every year there is very increasing number of electricity thefts across domestic electricity association similarly as industrial electricity supply, which ends in loss of electricity corporations energy and since of that we tend to face the frequent issues of load shading in urban also as rural areas therefore to overcome the requirement of electricity for whole state. Electrical energy is universally accepted as a necessary goods for people in general. Energy is that first cause of economic process and is significant to the sustenance of recent economy. Future economic process crucially depends on the long-run availability of energy from its sources.

The system mainly aims at middle class and lower middle class family to bring their electricity bill down with the assistance of the ability consumption controlled system. Energy meters being deployed at homes are used for reading the ability that's being consumed. Each consumer may fix a customized threshold value. If the worth reaches higher than the edge, the power is cutoff with a prior notification to the consumer. The graph or the amount of electricity consumed can be visualized with the help of a mobile application where the report is given to the user periodically. The customers can fix their own threshold budget values and can be simply custom-built supported their needs. Major parts employed in this project area unit ARDUINO Board, GSM module, current sensors and load.

2. LITERATURE SURVEY

1. Prepaid Energy Meter using Arduino and GSM Module

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From this paper collect information about component used for our project.

2. GSM Based Electricity Theft Detection

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Regarding GSM information.

3. Home Automation System Using Arduino and Gsm

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The proposed home automation system allows user to switch ON and OFF the lights, fans etc. From any part of the world since this system is controlled using GSM module.

3.BLOCK DIAGRAM

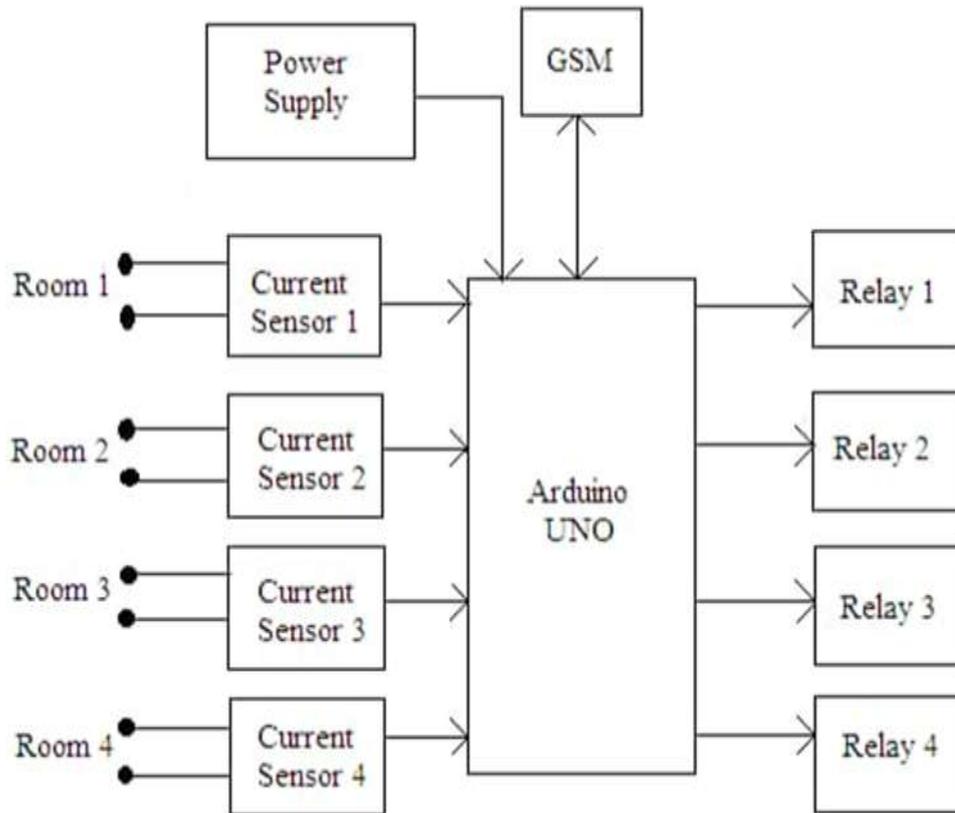


Fig.1 Block Diagram Of System

Block diagram consist of:

- 1) Arduino UNO
- 2) GSM
- 3) Relay
- 4) Current Sensor

3.1 Arduino

The Arduino Uno is a micro controller board based on the ATmega328. It has 14 digital input/output pins of that 6 will be used as PWM outputs, 6 analog inputs, a 16 MHz ceramic resonator, a USB association, a power jack, an ICSP header, and a reset button. The Arduino Uno is a micro controller board based on the ATmega328. It has 14 digital input/output pins of that 6 will be used as PWM outputs, 6 analog inputs.

Arduino is a general purpose micro-controller that can be programmed by using Arduino IDE software. It consists of a microcontroller with on-chip memory and pins for interfacing external devices. The one that used in this system is Arduino Uno. Microcontroller on the board is ATMEGA328.

3.2 GSM

The GSM could be a worldwide, cellular technology that is the foremost wide used these days. This shield allows an ARDUINO board to receive and send SMS, connect to the internet and make voice calls. The GSM works in the 900MHz band (Asia). A GSM module or a GPRS module may be a chip or circuit that may be used to establish communication between a mobile device or a computing device and a GSM or GPRS system.

3.3 Relay

A relay is an electrically operated switch that consists of an electromagnet and is operated by a little current which will close up a bigger current. The relay used here is a 5V, single channel relay and is well compatible with the ARDUINO. It has

connections – Common (COM), commonly Open (NO), commonly Closed (NC) brought bent 3 pin screw terminals.

3.4 Current Sensor

Measuring the alternating current source is not an easy task, very few devices are available for measuring a great amount of load. A current transformer consists of a primary coil, magnetic core and a secondary coil, alternating current flowing in the primary coil produces magnetic field which induces current proportional to the primary coil in the secondary coil.

4. Simulation Diagram

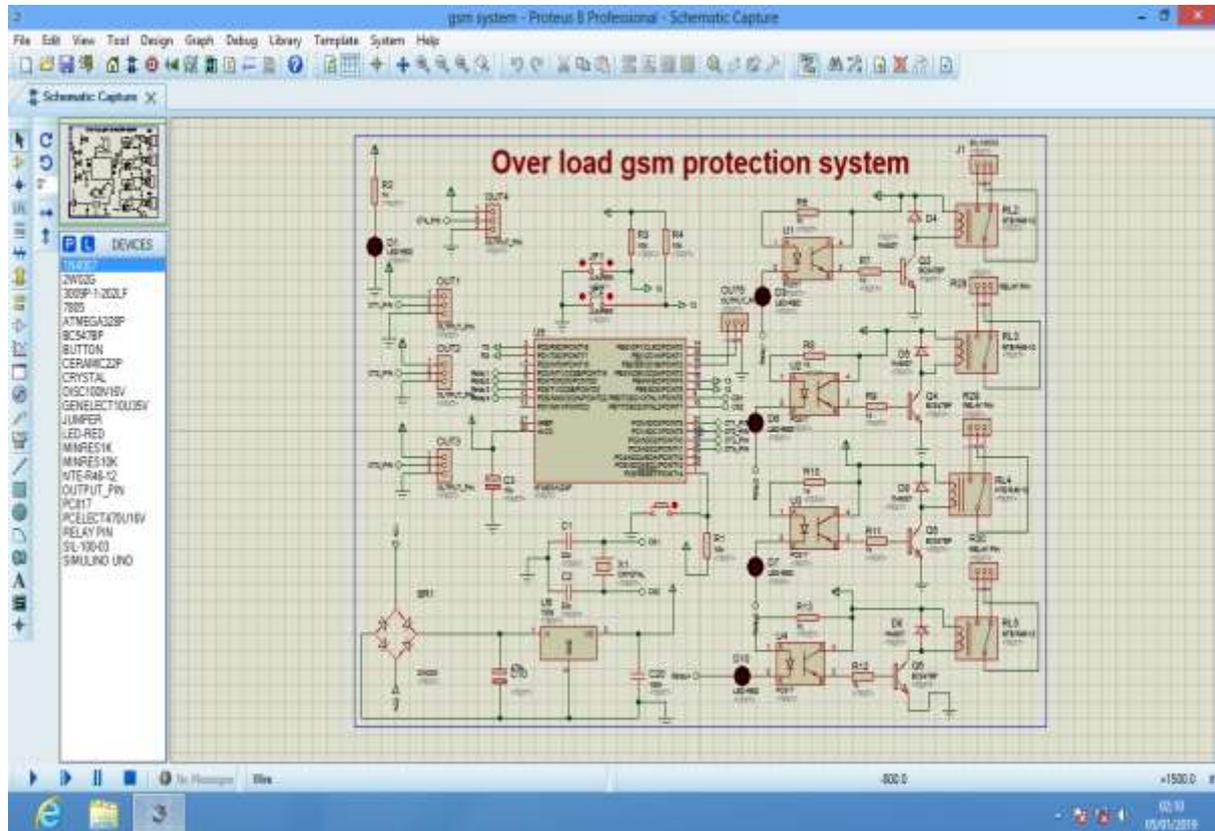


Fig.2 Simulation of the system

The Power supply 5V is connected to ARDUINO board and GSM module. The Arduino TX is connected to the GSM RX pin, Arduino RX is connected to the GSM TX pin this is the connection between Arduino and GSM. current sensor is used for the to sens current.

Arduino and GSM module Connections-

- GSM RX - Arduino TX
- GSM TX - Arduino RX.

5. Working Of Project

Main objectives of this project is to control use of energy and minimize the electricity bill. In the hostels or private apartment their are gives some restriction to use of energy. In this project have give threshold value of load current to each room by using comparator circuit. Considering for one room load is one fan, two bulbs, 150W plug socket.

Suppose,

Two blub of 7W, current is 0.06A

One fan of 70W, current is 0.30A

One socket of 150W, current is 0.65A

Total current of one room is 1.01A

Means selected threshold value of current 1.5A which is near to total load current of room.

When large wattage equipment connect at particular room then current goes higher than 1.5A which is threshold value and then relay operated and main supply of this room cut for perticular time and then gives notification to the owner through GSM Module.

6. Project Hardware Design

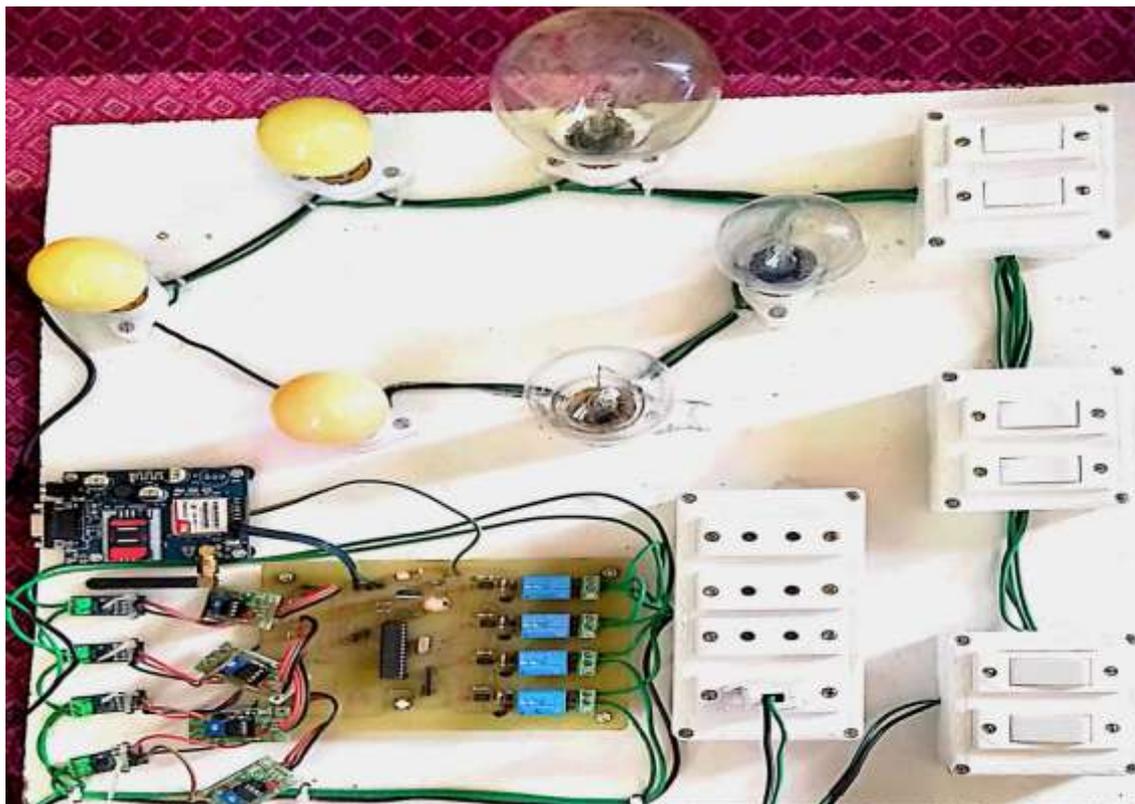


Fig.3 Project Hardware Design

7. FUTURE WORK:

There are several drawbacks of this system which can be further improved. Using GSM module and sending text message may cost charges so an interface can be developed for communication of Arduous with a mobile phone. A GUI may be created that shows a blueprint of the area during which appliances like lights and fans may be controlled by touching them on the screen. A feedback mechanism or a power consumption mechanism are often additional that shows the current status of appliances and power consumed by them. For atiny low demonstration purpose a LCD screen is connected that shows the status of appliances i.e ON or OFF. Further, an acknowledgment SMS can be sent from Arduous to Mobile which tells whether the appliances are ON or OFF.

8. ACKNOWLEDGEMENT:

We would like to thank our guide Prof.Sandeep.N.Yadav of Electrical department for the valuable guidance and constructive suggestions,this helps us in making our project.

9. CONCLUSION :

The most important points concluded from this work can be summarized as below :

1. The mobile phone did not need to have any special applications or hardware to be used in this system, and any mobile phone supporting the SMS service could be used in the system.
2. At normal situation, just one mobile phone number depended to send/receive command messages in this system i.e .homeowner's phone number. But, to add additional numbers (e.g. his wife's phone number), it can be done very easily by changing the related source code.
3. One of the most important concluded points, is that the homeowner can use this system (controlling and monitoring) from anywhere overall the world. This process can be done, by exchanging his phone number via sending an SMS contains the new phonenumber and depended secret code to the controller.
4. Thus, the Power Consumption controller Alert System is used to alert the user regarding his consumption of electricity. This helps in saving electricity and also keeping the electricity bills under limits. A small module consisting of the ARDUINO board and GSM can be installed with energy meter to make the electricity consumption smarter.

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