



Development of an affordable Smart Home Energy Management System Operating via SMS using Arduinouno

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ABSTRACT: Energy can neither be created nor destroyed but can be mismanaged which can lead to financial and safety consequences. This work propose a device, using arduino microcontroller, a relay, a GSM module, to develop a remote control in switching on and off of home appliances such as bulbs, air conditions, heaters other energy consuming appliances. In this paper we are using ATmega8 embedded microcontroller with a dedicated port for future reprogramming in implementing this technique in homes. These appliances like fridge, bulb, fan, television, air conditions, heaters etc. are connected to the microcontroller through the relay. We can switch ON and OFF the appliances by using switches whenever we need. The power consumed by the appliances is measured, the consumption of power by the appliances is measured by the sensing unit. The power used is calculated with the help of current transformer. The reading of the consumed energy will be displayed on an LED display. The GSM module will send and receive command using text massaging. The main significance of this project is to remotely control (ON and OFF) home appliances via text massaging. The device is developed using cost effective and affordable materials.

KEYWORDS: AtMega8 microcontroller, relay, voltage and current sensors, GSM module.

INTRODUCTION

An energy management system (EMS) is any computer-aided tool or tools used mostly by electric utility grid operators to monitor, optimize, and control the performance of a generating and/or transmitting system. it is also used in micro grids.

As wireless communication is gaining ground day by day. It made it easy for us to use mobile phones to remotely control household appliances and to receive alert via SMS about the energy consumption in the house. In this paper we describe a remote appliance control system which can control different household appliances by sending an SMS from a mobile phone and monitor the energy consumption in the house just by a SMS remotely. This controller is extremely handy when we are away at places where we cannot monitor or control the energy consumption in the house manually, we can use this device to monitor and control the ON and OFF switching of the appliances as no wired connection is required between the switch and the home appliances as it can be controlled from any place in this world with a GSM service. The microcontroller would then control the home appliances based on the information given to it and send a feedback. The proposed solution is easy to use, it is simple, secure, and robust.

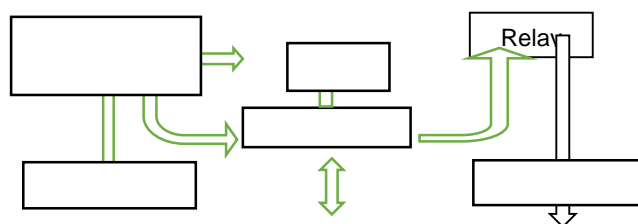
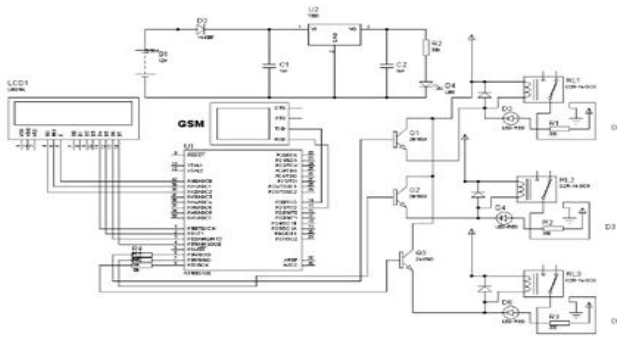


Fig. 1 block diagram of the device.

This system consist of two parts, the hardware which consist of embedded system that is based on 8-bit microcontroller (ATMega8), a GSM handset with GSM Modem (SIM900), relay module, voltage and current sensors. The software part consists of programming an arduinouno microcontroller. The GSM modem provides the medium of communication between the home owner and the system via short message service (SMS).

METHODOLOGY

This device is developed to help households in monitoring and controlling remotely high consuming home appliances. The microcontroller (AtMega8), the relay and display are powered by a power source. The arduino which is the microcontroller is connected to the display and the GSM modem where one is an output device and the other serve as both input and output device. The microcontroller is also connected to the relay which serve as an electric switch, the relay is connected to the loads to be managed. The sensors both voltage and current are input devices attached to the AtMega8 to provide voltage and current consumption of the home appliances. The microcontroller is programmed to calculate the power consumed by this appliances with the GSM module serving as clock. At a certain set amount of power consumed, the microcontroller command the module to send an SMS alert to the programmed number of the owner's GSM handset. The owner then can send an SMS command (if he wishes so) to be executed, this SMS is sent to the GSM modem via the GSM public networks as a text message with a definite predefined format, the commands sent will be executed by the microcontroller. The system will interpret the commands and turn the appropriate appliance/s ON/OFF accordingly via the relay which serve as the switching module.



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