GSM Based Home Appliances Automation and Energy Auditing

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Abstract*: The latest trend in the technologies related to wireless communication has led to the emergence of several engineering designs for human requirements. The creeping interests in the wireless and GSM based projects. We came up with this idea of developing a simpler, multipurpose, cost-effective design to control the home appliances via short message service (SMS). In existing systems there are several methods to control home appliances such as Bluetooth, Zigbee which have limited distance to perform operation but GSM has a global coverage, so we have chosen this project. Commands are sent to appliances through user mobile as data by sending SMS providing a cost effective, reliable far reaching access to the user. Base station controller that receives the messages, decodes the messages, initiates required automation operations and responds to the successful initiations by a reply to the user. Tools required for this project are Arduino IDE software (1.8.0) and Docklight software (2.2.8).*

Keywords*: Power source, GSM circuit, microcontroller, SIM, Energy Meter.*

I.INTRODUCTION

The main objective of home automation and security is to help handicapped and old aged people who will enable them to control home appliances and alert them in critical situations. The system proposed provides to control the home appliances using GSM network, androids APK and Arduino board. The preface of the Global System for Mobile Communication (GSM) and mainly the use of cellular phones got the novelty of distance communication at remote location. For example, a person on a drive within his car all of a sudden memorizes that he left the Cooler, ON actually it should be OFF. The usual circumstance is to drive back and switch OFF. But with the Android mobile phone in the hand equipped with GHAS (GSM Home Automation System) Application, one looks on how the same could be used to result control at any point, anywhere and time without considering any geographical locations. Today's GSM stage is living, developing and advancing and as of now offers an extended and characteristic-rich "family" of voice and empowering administrations. The Global System for Mobile Communication (GSM) system is cell telecommunication system with an adaptable structural planning following the ETSI GSM 900/GSM 1800 standard. Siemens usage is the advanced cell versatile correspondence framework D900/1800/1900 that uses the precise most recent innovation to meet each prerequisite of the standard.

II.SYSTEM MODEL AND ASSUMPTIONS

Hardware implementation of Auto light intensity and Auto switching system control for home appliances is proposed. We used AT COMMAND for functionally of street light just like server used. By sending a SMS onto microcontroller by the help of mobile they read it and match by itself. If microcontroller is accept them then, light is ON vice versa for OFF . Here we have used GSM wireless communication for controlling home appliances. We send some commands like "#A.light on*", "#A.light off*" and so on for controlling AC home appliances. After receiving given commands by Arduino through GSM, Arduino send signal to relays, to switch ON or OFF the home appliances using a relay driver. Energy meter is used to measure the power consumed by the appliances. Optical probe is used to interface with the energy meter and USB to serial converter is used to interface with the laptop. DOCKLIGHT software is used to read the energy meter. In this diagram we are using this type of methodology.

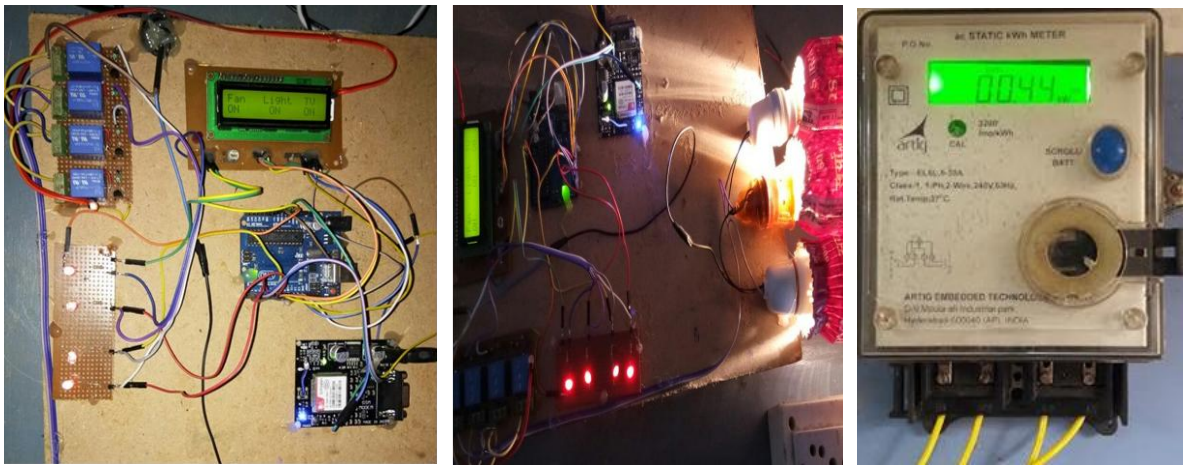

Fig.1 Circuit diagram of GSM based Home appliances automation with Energy Meter.

The architecture consists of these specific features

- GSM SIM (sim900)
- GSM circuit (capacitor, power supply 2.7V, antenna)
- Arduino UNO (ATmega328)
- Relay 5 volt
- Bulbs with holders.
- Connecting wires
- 16x2 LCD
- Power supply
- Cell phone
- Four LED's
- Energy meter
- Optical probe
- USB to serial converter

III.EFFICIENT COMMUNICATION

GSM based home appliances automation describe the new economical solution for managing the home appliances and power saving energy. This system consists of electrical device, GSM modem and control circuitry. The client server directly connected with the web based application to control any home appliances from any one position. Arduino controller will receive that SMS and will decode it and finds out the particular home appliance which needs to put ON/OFF by using relay circuit. Here the Arduino controller ATmega328 is connected to GSM modem through its UART port (Serial Ports). ATmega328 cannot connect to GSM modem directly due to disturbance in voltage levels. So modem is connected directly through voltage level convertor MAX 232. There are 2 lines Tx (TRANSMITTER) & Rx (RECIVER) connected to the MAX 232.The MAX232 is connected to GSM modem via RS 232 cable. An oscillator circuit of 5 MHz is connected to the ATmega328P. One of the port of ATmega328 is connected to relay driver circuit which will help ATmega328 to switch power OFF/ON of home appliances. ATmega328 will continuously reading the serial port after every second for new SMS. Ones the SMS came it will try to forward that SMS from GSM modem using AT commands.

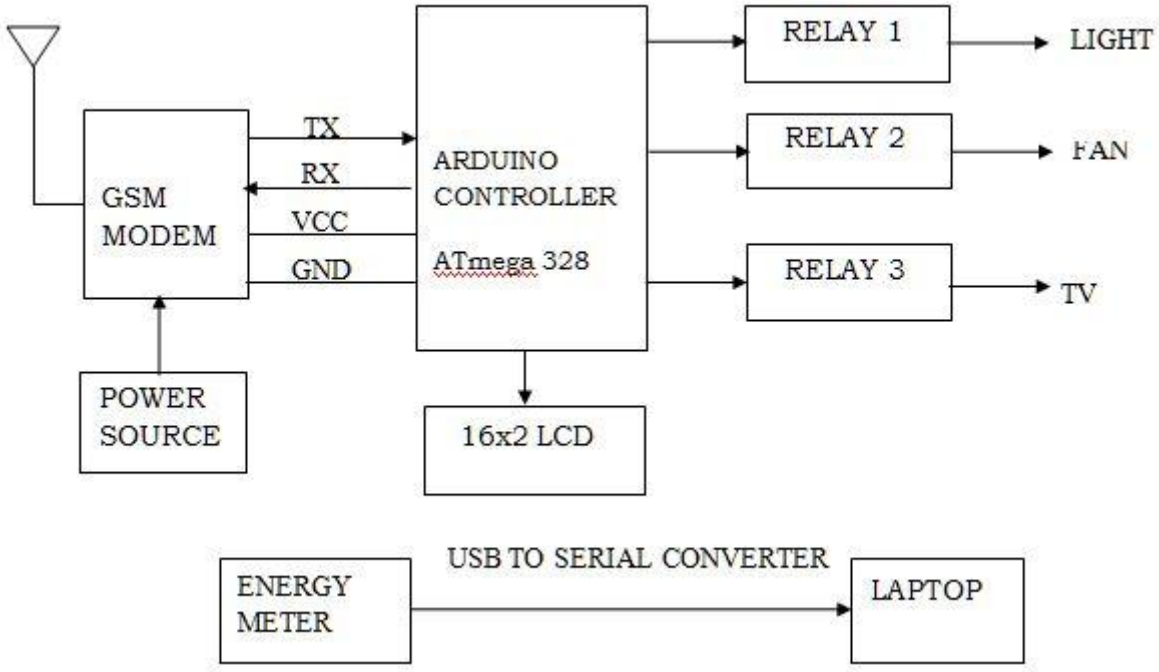

Fig. 2 Functional block diagram

The entire home appliances are connected to relay driver circuit. When we send SMS to GSM module by Mobile, then GSM receives that SMS and sends it to Arduino. Now Arduino reads this SMS and extract main command from the received string and stores in a variable. After this, Arduino compare this string with predefined string. If match occurred then Arduino sends signal to relay for turning ON and OFF the home appliances. And relative result also prints on 16x2 LCD by using appropriate commands. The energy meter is capable of detecting and recording the anti tamper features including neutral missing, magnetic tamper.

IV.ADVANTAGES AND APPLICATIONS

ADVANTAGES

- Home makes home owner life comfortable and easier.
- It saves money and energy.
- It is user friendly.
- GSM has global range.

APPLICATIONS

- Home automation, which was the seed for developing the idea of project.
- Remote device control.
  a) This will help to eliminate need of human personnel attending the device till it has to be switched OFF/ON.
  b) User can control device in case of forgetting to do so while leaving for some other places.

V. RESULT AND DISCUSSION

By sending a SMS to microcontroller circuit by the help of GSM circuit through mobile the unit of home

appliance automatically switch ON/OFF. LED should indicate whether the home appliance is on or off and they should be control by using fix timer. Therefore wastage of time and requirement of skilled worker is reduced to a great extent. We can monitor and control more parameters and devices. We used in various rooms like seminar hall, conference room, and study rooms in college where the capacity of room is limited and should not be exceeded.

VI.CONCLUSION

Thus message is decide whether the home appliance should ON/OFF by the help of GSM and microcontroller circuit It enables regulate their communication strategies according to dynamically changing network environment. Home appliance should work on the systematic manner by the help of circuit and huge reduction in power consumption. Recently, the home automation market is very promising field that is growing very fast and needs vast range of developments that can be carried out in the concept of smart home. In this project design and implementation of smart GSM house was considered. ATmega328 microcontroller with the cooperation of GSM provides the smart automated house system with the desired baud rate of 9600 bps. Finally, auditing of energy consumption is done by using Energy meter (Docklight software).

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