Design and Implementation of Smart Home Control Systems Using GSM

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Abstract- *This paper focuses on design of smart home control system based on GSM wireless technology. The most account of energy is caused by the inefficient use of the consumer electronics. Particularly, Air conditioner accounts for a great part of the total energy consumption. This paper introduces the proposed home energy management system design that provides intelligent services for users like world wide connectivity and status display.*

Keywords- Smart Phone, GSM, Power line communication, SMS, Sensors.

I. INTRODUCTION

Households consume one-fifth of the nation's energy each year, with 60 percent of that consumption in the form of electricity. At the same time, utilities are struggling to manage the peak energy demand dilemma, where about 10 percent of electric generating capacity exists only to be used less than one percent of the time. However, huge cost savings, reliability improvements and energy efficiency gains can be achieved within homes and across the energy grid without having to build additional power plants if energy demand can be made to respond dynamically to the available energy supply. In fact, to do less is no longer an option from either a financial or environmental perspective.

II. RELATED WORK

There are many definitions of home energy management available in the literature. Changsu Suh et al [1] Ubiquitous home networks excite new possibilities and address a new intelligent home control system based on active sensor networks to make home networks more intelligent and automatic.

Dae-Man Han et al [2] A smart home control system can provide both significant cost savings in a home environment, as well as a great level of flexibility and control for the building administrators, and great comfort for the occupants. The most effective way to reduce lighting energy is to turn lights off. The second most effective way is to turn them down. An automated control system can do both for you based on factors such as occupancy, available daylight and time of day. Removing the wires from the lighting controls provides additional benefits, including greater flexibility in where controls can be placed, and significant savings in installation by avoiding the expense and disruption of wiring.

Subhas Chandra Mukhopadhyay et al [3] proposed an efficient method for internetworking of 802.15.4 with IP network. The key idea of the proposed method is to provide a low-cost solution and flexible connection mechanisms for integrating Internet of things with home monitoring systems. The advantages of the developed system are to have greater control over routing of packets (security and customization) and ability to adapt to other wireless sensor networks. The QoS of the integrated network architecture is determined in terms of two parameters i) throughput and ii) reliability.

Yang Xiao et al [4] presented the models for building environment control using WSANs. Two control schemes are described in detail: a CC scheme in which control decisions are made by a single centralized controller based on global information and a DC scheme in which control decisions are made by distributed actuators based on local information.

Pooyan Jahangiri et al [5] a PHIL test bed for HES has been presented. The test bed allows for running combined signal level and power level HIL simulations covering all domains relevant in respect of HES. Different HES components can be tested under realistic conditions. In addition to this, the platform can also be used to support the design process of HES components by applying the concept of incremental prototyping.

Jinsung Byun et al [6] WSN technologies have been applied to home automation system in order to provide the residents with smart home services. However, due to the fixed system architecture, existing sensor systems are not well-suited in dynamic environments such as a smart home.

III. PROPOSED SYSTEM

In proposed system GSM module using for world wide connectivity. The proposed system using 16x2 LCD display for

monitor the device. Through this we can control and monitor the device and block diagram shown in fig.1.

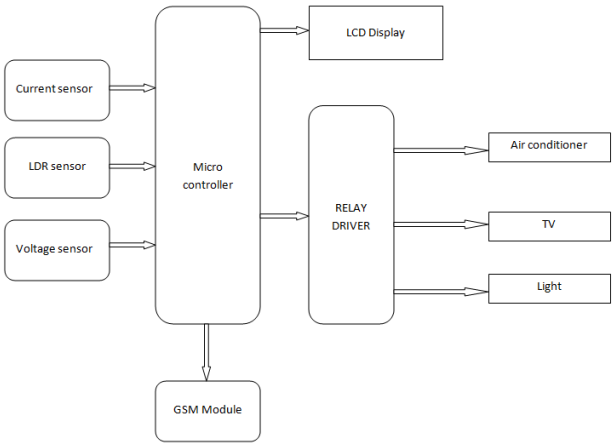

Fig 1.Block diagram

The GSM based Home Energy Management System (HEMS) is developed using various mobile programming language and cross mobile platform like Windows, Java Me, Android respectively.

IV. PROPOSED SYSTEM MODULE AND DEVICES

In proposed system used for microcontroller, GSM Modem, Sensors, LCD display and Relay components.

GSM Module: GSM (Global System for Mobile Communications, originally Groupe Spécial Mobile), is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe used by mobile phones. The GSM standard was developed as a replacement for first generation (1G) analog cellular networks, and originally described a digital, circuit-switched network optimized for full duplex voice telephony. This was expanded over time to include data communications, first by circuit-switched transport, then packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS).

GSM also has the advantage of using SIM (Subscriber Identity Module) cards in the U.S. The SIM card, which acts as your digital identity, is tied to your cell phone service carrier's network rather than to the handset itself. The GSM architecture is shown in fig 2.

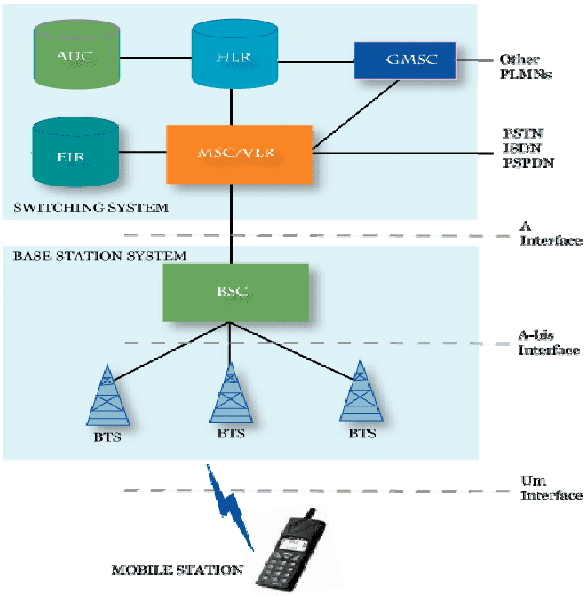

Fig.2.GSM Architecture

A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.

The smart phone used for this project has to be received a setting in order to access and control the devices in the home. The home accessible settings have the layout of available rooms and available devices at home premises.

Liquid Crystal Display (LCD)

LCD combines the properties of both liquids and crystals and shown in fig 3. The LCD does not generate light and so light is needed to read the display. By using backlighting, reading is possible in the dark. The LCD's have long life and a wide operating temperature range.

The LCD does not generate light and so light is needed to read the display. By using backlighting, reading is possible in the dark. The LCD's have long life and a wide operating temperature range. Changing the display size or the layout size is relatively simple which makes the LCD's more customers friendly.

Fig 3. LCD Display

Relay: A relay is an electrically operated switch and diagram shown in fig 4. Current flowing through the coil of the relay

creates a magnetic field which attracts a lever and changes the switch contacts.

Fig.4 Relay

Relay shown in fig allows one circuit to switch a second circuit which can be completely separate from the first. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit.

8051 Microcontroller

The Intel MCS-51 (commonly termed 8051) is an internally Harvard architecture, complex instruction set computing (CISC) instruction set, single chip microcontroller (µC) series developed by Intel in 1980 for use in embedded systems. Intel's original versions were popular in the 1980s and early 1990s and enhanced binary compatible derivatives remain popular today. It is shown in below fig .5

Fig 5. Microcontroller

The MCS-51 has four distinct types of memory – internal RAM, special function registers, program memory, and external data memory. The 8051 is designed as a strict Harvard architecture; it can only execute code fetched from program memory, and has no instructions to write to program memory.

Several C compilers are available for the 8051, most of which allow the programmer to specify where each variable should be stored in its six types of memory, and provide access to 8051 specific hardware features such as the multiple register banks and bit manipulation instructions. There are many commercial C compilers. Small Device C Compiler (SDCC) is a popular open source C compiler. Other high level languages such as C++, Forth, BASIC, Object Pascal, Pascal, PL/M and Modula-2 are available for the 8051, but they are less widely used than C and assembly.

V. SIMULATION

Step1: Click on proteus 8 professional. In the central area i.e. place the components and then design in according to overall circuitIt is most commonly used section of proteus. It has a lot of function on it.

These sections show the different button like play, stop etc. When you design some circuit in proteus, then you want to run it in order to whether it's work or not. So in order to run the circuit, you have to click on this play button. So when you click on the play button the circuit starts to run, now click on pause button and it will pause and stop to stop the circuit running

Step2: Initially all the modes are in OFF condition .There are two units namely 80 units and 180 units. It also can be extended depending upon the user requirement

Step3: Switch ON the unit the(80 unit) & also give the different loads such as lights, AC and any other load

Step 4: When the unit increases, a display shows the counting level of the units being used the extra or over loads are ON

Step 5: Simulation output

If the load exceeds the 80 units & automatically the display shows the consumed. Unit level and as well as it sends the manage to the particular mobile number and diagram shown in fig 6.

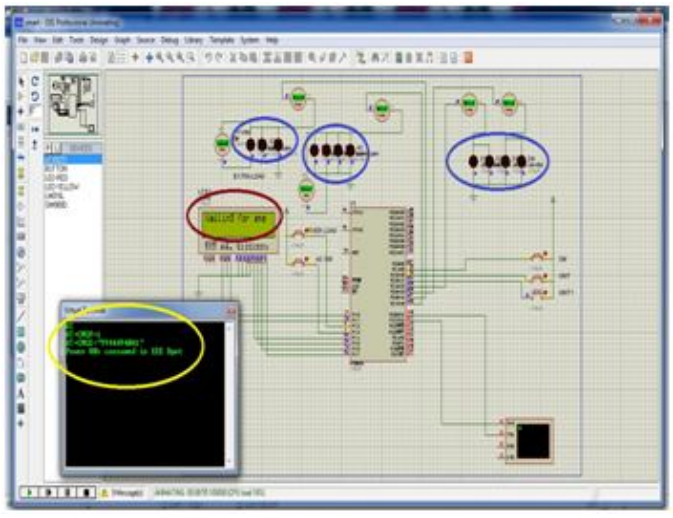

Fig.6 Simulation output

Step 6: If the user needs the power again, they have to acquire it through SMS

VI. CONCLUSION

Design and implementation of smart home control systems based on wireless sensor networks using GSM has been discussed. A smart home control system can provide significant cost savings in a home environment, as well as a great level of control for the building administrators and great comfort for the occupants. The proposed system utilizes multi sensors and wireless communication technology in order to control House hold equipments according to the users. The proposed system can autonomously adjust the minimum light intensity value to enhance both energy efficiency and user satisfaction

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