Design and Development of Activation and Controlling Of Home Automation System VIA SMS through Microcontroller

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Abstract:- This paper mainly focuses on the controlling of home appliances remotely when the user is away from the place. The system is SMS based and user uses wireless technology (GSM). The system uses GSM technology thus providing universally access to the system for automated appliance control. GSM (Global Systems for Mobile Communication) is vastly used because of its simplicity in both transmitter and receiver design, can operate at 900 or 1800MHZ band, faster , more reliable and globally network . This project is designed for seven power grids. 8051 Micro Controller is the heart of the project.

Index terms:- Global System for Mobile communication (GSM), Short Message Service (SMS), 8051 Micro Controller.

I. INTRODUCTION

The objective of this paper is to investigate a cost effective solution that will provide controlling of home appliances remotely. The motivation was to facilitate the users to automate their homes having universal access. The home appliances control system with an affordable cost was thought to be built that should be mobile providing remote access to the appliances.

There was a need to automate home so that user can take advantages of the technological advancement in such a way that a person getting off the office does not get melted with the hot climate. Therefore this paper proposes a system that allows user to be control home appliances universally via SMS using GSM technology. Ciubotaru-Petrescu et.al [1] presented a design and implementation of SMS based control for monitoring systems. The paper has three modules involving sensing unit for monitoring the complex applications. A processing unit that was 8051 microcontroller and a communication module that used GSM module or cell phone. The SMS issued for status reporting such as power failure.

Murthy et.al [2] explored primary health-care management for the rural population. A solution proposed the use of the mobile web-technologies providing the PHC services to the rural population. The system involves the use of SMS and cell phone technology for information management, transactional exchange and personal communication.

II. PROPOSED SYSTEM AND METHODOLOGY

We proposed home appliance control system based on GSM network technology for transmission of SMS from sender to receiver. SMS sending and receiving is used for universal access of appliances and allowing breach control at home. Appliance control subsystem enables the user to control home appliances remotely.
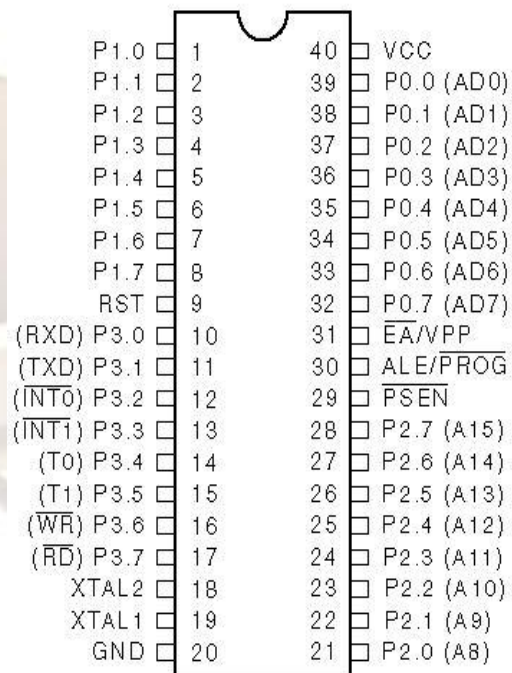

Figure 1: Pin Diagram of Microcontroller

The system is capable enough to give feed back to user about the condition of the home appliance according to the user's needs and requirements. The home appliance control system consists of the following components;

Microcontroller: This unit contains the software components such as the home appliances control system through which the appliances are controlled. The 8051 Micro Controller pin diagram is given below.

PIN DESCRIPTION:
Vcc:Pin 40 provides supply voltage to the chip. The voltage source is +5V.
GND:Pin 20 is the ground.
XTAL1 and XTAL2 & XTAL1 and XTAL2 are the input and output, respectively, of an inverting amplifier that can be configured for use as an on-chip oscillator, as shown in Figure 11. Either a quartz crystal or ceramic resonator may be used. To drive the device from an external clock source, XTAL2 should be left unconnected while XTAL1 is driven, as shown in the below figure. There are no requirements on the duty cycle of the external clock signal, since the input to the internal clocking circuitry is through a divide-by-two flip-flop, but minimum and maximum voltage high and low time specifications must be observed.
GSM Module: Global System for Mobile (GSM) is a second generation cellular standard developed to cater voice services and data delivery using digital modulation. It is a globally accepted standard for digital cellular communication. GSM is the name of standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900MHZ.
Mobile Device: Cellular phone containing SIM card has a specific number through which communication takes place. The device communicates with the GSM Module via radio frequency. Mobile user transmits SMS using GSM technology. will call GSM Module and it will get activated.

Working: The working of Home Appliances Control System model (shown in Figure 2) is explained:-
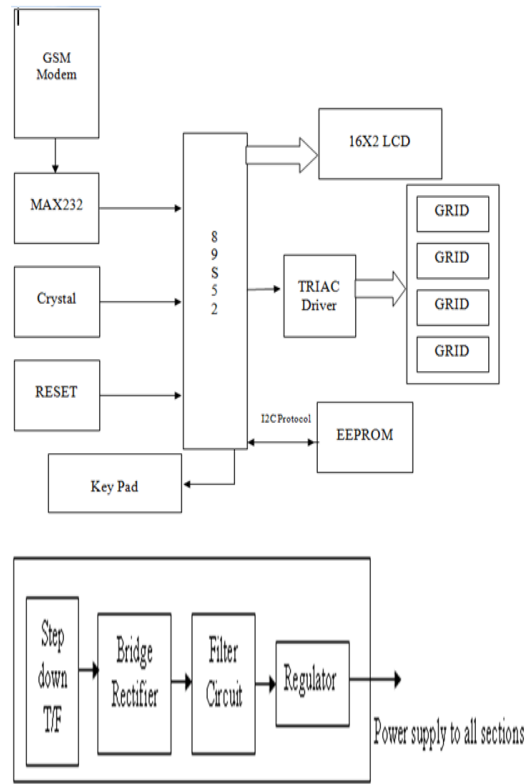

Figure 2: Diagram of Home Appliances Control System

Figure 3: Diagram of Main Project Kit

Microcontroller: Microcontroller being the main module has home appliances control system installed on it. Appliances control is responsible for ubiquitous access of appliances. Systems work on GSM technology for transmission of instructions from sender to receiver.

GSM Module: GSM module is a plug and play device and is attached to the Microcontroller which then communicates with the Microcontroller via port. GSM module is a bridge responsible for enabling/ disabling of SMS capability.

Cell Phone: Mobile device communicates with the GSM module via radio waves. The mode of communication is wireless and mechanism works on the GSM technology. Cell phone has a SIM card and a GSM subscription. User transmits instructions via SMS and the system takes action against those instructions. Methodology

III. STRENGTHS OF HOME APPLIANCES CONTROL SYSTEM

Home appliances control system has many advantages such as remote controlling of home appliances, availability and ease of users. The user can get alerts anywhere through the GSM technology thus making the system location independent. The system contains low cost components easily available which cuts down the overall system cost.

The ease of deployment is due to wireless mode of communication. GSM technology provides the benefit that the system is accessible in remote areas as well. The system integration is simple and is also scalable and extensible.

IV. CONSTRAINTS OF HOME APPLIANCES CONTROL SYSTEM

The system functionality is based on GSM technology so the technological constraints must be kept in mind. The system is vulnerable to power failure but this disruption can be avoided by attaching the voltage source thus allowing users to avail the great advantage of this system.

Operating Procedure:
1) Switch ON the GSM modem and wait for 30seconds.
2) Power up the controller board.
3) If the user wants to change the number.
   Then press # When Prompted.
   If the user presses # key then:
   ➤ Enter the 10 digit phone no when prompted.
   ➤ To confirm press '#' key.
   ➤ To confirm again press '*' key and to cancel press '#' key. If the user presses '#' key, please follow instructions from step3.

4) Now the G.S.M modem is ready.
5) To switch ON devices. The user has to send the following messages to the gsm modem.
   "APP1 ON"
   "APP2 ON"
   "APP7 ON"
6) To turn off a device. Send the message to the gsm modem.
   "APP1 OFF"
   "APP2 OFF"
   "APP7 OFF"
7) To turn off all devices send message "RESET" to the GSM modem.

V. RESULTS

The results of the home appliances control system:-The system will check various GSM hardware tests and will run to check the hardware support. The system then opens the serial port for communication with the GSM module. On successful port opening the system communicates with the GSM Module but if fails system does not communicate. The system checks support for battery level, signal strength and GSM Module SMS sending and receiving capability. If these tests succeed the system gives response of 'OK', if not then 'ERROR' is returned. The remote user sent SMS with security code from a cell phone on the home appliances control system to turn on/off the specified appliance and the system performed the respective function by simulating the appliance on/off as directed by the user.

Appliance	SMS Sent By User	System Response
Air Conditioner	ac on. ac off	AC button simulated to on/off
Light	light on. light off	Light button simulated to on/off
Fan	fan on. fan off	Fan button simulated to on/off

Table 1: Results of Home Appliance Control System

Achieved analytical results:-
• System allowedthe provision of security such that system took no action against the instructions received from SMS without security code. The required task was performed only when the SMS with security code instructed the system.

- Remote Controlling capability of the system allowed user to switch on/off through simulating the appliance as directed by the incoming SMS.
- The system automatically performed tests and checked support for available features and SMS sending and receiving capability and configured system accordingly.

VI. CONCLUSION

In this project work, we have studied and implemented a complete working model using a Microcontroller. The programming and interfacing of microcontroller has been mastered during the implementation. This work includes the study of GSM modem using sensors. GSM network operators have roaming facilities, user can often continue to use there mobile phones when they travel to other countries etc..

VII. FUTURE DIRECTION

In future the system will be small box combining the microcontroller and GSM Module. The hardware will be self contained and cannot be prone to electric failure. This appliance will have its own encapsulated UPS and charging system. This system is developed for mobile reporting application only. It also can be interfaced to computer system to record and process data base. As the given system is switch on only one load, in future the system is designed for multiple switching on and off different loads at a time.

VIII.REFERENCES

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