A RESEARCH ON CELL PHONE BASED POWER CONTROL SYSTEM

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ABSTRACT:

Home power consumption tends to grow in proportion to the increase in the number of large-sized electric home appliances. An embedded system without any new additional wiring has been developed for home power management. By using power line communication (PLC) technology, electric home appliances can be controlled and monitored through domestic power lines. This paper demonstrates a novel method which enables users to control their home appliances and systems from remote using a cell phone-based interface. To access the control unit, the user should send an authentication code (DTMF) along with the required/desired function/action to his/her home control system via Global System for Mobile communication (GSM). Also, if we are away from home we may have to turn on the lights at night. These are normally not possible in present condition. This paper offers a solution for this problem by using a mobile phone, a common electronic device like AC, tube light, fan, water pump etc. can be controlled by using this circuit. This paper offers a solution for this problem by using a mobile phone, a common electronic device like AC, tube light, fan, water pump etc. can be controlled by using this circuit.

Keywords: *Mobile Phone, Control system, Power management.*

INTRODUCTION:

Now-a-days homes and offices are equipped with various electronic machines and equipment. Most are always controlled manually using either hand held remote control device or manually switching them ON or OFF. However, this may not be possible all the time as the operator may not be at home. In some instance, it is possible to have forgotten to either switch the appliances OFF or ON and this means the operator needs to travel down to where the appliances are in order to control them. Hence, there is a growing desire to have a device or mechanism which allows users to remotely monitor and control these electronic appliances without distance being a barrier. This work presents an innovative way to solving the problem discussed above by designing and implementing a GSM based electronic appliances control and monitoring system which uses the concept of SMS made available by hand held mobile devices. The uniqueness of this approach is that the GSM module is incorporated into the switching unit which gives a single compact unit.

LITERATURE:

Kingsley Okeoghene Enalume et al (2016) This paper presents a method for users to control their home and office appliances remotely using a mobile phone. This is borne out of the desire to minimise accidents and prevent damage to electrical appliances as a result of not switching off electrical appliances such as pressing iron, electric heater, etc, which can result in fire incidence and damage.

Oyediran Mayowa Oyedepo et al (2016) This paper presents a GSM based electronic appliances monitoring and controlling system. This enables individuals to connect their home or office electronic appliances to the developed

system which in turn enables them to remotely monitor and control these appliances though a Short Message Service (SMS).

Bishwajit Banik Pathik et al (2014) this paper presents the technical construction of a standalone vehicle controlled by GSM communication network. The designed GSM based solar powered vehicle could be operated from almost anywhere under GSM network which is powered by solar energy using 5 watt photo voltaic (PV) panel, stored in 3 similar 4V rechargeable batteries.

Onukwugha et al (2013) The current trend in computing has launched us into a world of numerous, easily accessible computing devices connected to each other and to an increasingly ubiquitous network infrastructure which has created new opportunities in Information Technology. This paper presents a smart space of networked devices which is programmed with a mobile phone. We used object- oriented methodology to model the home appliances.

Hsien-Chung Chen et al (2011) Home power consumption tends to grow in proportion to the increase in the number of large-sized electric home appliances. An embedded system without any new additional wiring has been developed for home power management. By using Power Line Communication (PLC) technology, electric home appliances can be controlled and monitored through domestic power lines.

Chia-Hung Lien et al (2010) In this paper an embedded remote monitoring and controlling power socket (RMCPS) has been developed with high suitability for automatic and power management of home electric appliances. It requires no new layout and has the advantage of low cost, low electricity consumption, small volume and convenient installation to replace the PC with a Web server construction.

OVERVIEW OF THE SYSTEM

The switching system makes use of a receiver mobile phone that receives keypad tone sent by the user in the form of dual tone multi frequency (DTMF) [2, 5], an MT8870 DTMF based decoder for decoding the dual tone multi frequency into digital signals, a microcontroller unit which organises the switching action, a ULN2003A relay driver which controls the relays, relays which act as switches to control the devices and a power supply unit.

The switching system follows these basic operations: When a phone call is made, the mobile phone at the switching unit automatically answers the call and the desired control code is entered in the user mobile phone. The control codes are in dual tone multi frequency form and are decoded by the MT8870 DTMF decoder into digital signal [6].

The output of the decoder goes to the microcontroller that coordinates the activation or deactivation of the relays [2]. The ULN2003A relay driver consists of Darlington pair transistors and a diode to provide the necessary condition for the working of the relays.

The relays acts as switches connected to the devices to be controlled. When they are activated, the switch turns ON the device and when they are deactivated they turn OFF the device. The block diagram of the system is shown in Figure 1.

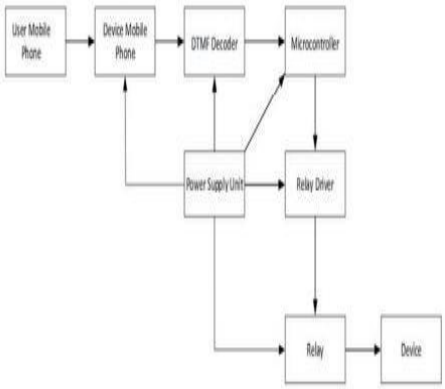

Figure 1 Block diagram of the system.

METHODOLOGY:

DTMF (Dual Tone Multi Frequency) The main principle of the DTMF is that it takes a number code from the number pad converts it to DTMF (Dual tone multi frequency) signal and a DTMF decoder converts the DTMF signal to a digital code that can be fed to a microcontroller. A DTMF generator generates two frequencies corresponding to a number or code in the number pad which is transmitted through the communication networks, constituting the transmitter section which is simply equivalent to a mobile set. In the receiver part, the DTMF detector IC, for example MT8870 detects the number code represented by DTMF back, through the inspection of the two transmitted frequencies. The DTMF frequencies representing the number codes is shown below.

DTMF frequencies corresponding to different number codes

1	2	3	A	697 Hz
4	5	6	B	770 HZ
7	8	9	C	852 Hz
*	0	#	D	941 Hz
1209 Hz	1336 Hz	1477Hz	1633 Hz	

Mobile Phone: Mobile Phone allows a subscriber to make or receive calls. It also allows a subscriber to send and receive SMS. To achieve this a subscriber Identity Module (SIM) is inserted into the mobile phone. Each key pressed on the phone generates two tone of different frequencies, known as Dual Tone Multi Frequency (DTMF) [2]. This feature of the mobile phone was employed in the design.

8051 Microcontroller: A microcontroller is a single chip that contains the processor, the ROM, the RAM, a clock and an I/O control unit. It is additionally called a "workstation on a chip"(small computer). Now a day's billions of microcontrollers units (Mcu's) are inserted every year in a different items from toys to spaceships. Case in point, a single vehicle utilizes 70 or more microcontrollers.

GSM module: GSM module SIM300 is being used in the project here. It is just like a cell phone with all the facilities of sending and receiving a message, sending and receiving calls. It has a communication that can be programmed using AT commands. Here the RX and TX pins are used for the serial communication with the microcontroller. There are various AT commands to check the signal strength and connection and SIM status etc. Here the Hyper Terminal is used to initially interface with the computer to check the module. It also has an antenna to receive the GSM signal from the user's phone. The basic AT commands are loaded into the program of microcontroller for it to interface with the GSM module.

Mode of Operation

The system has basically two modes of operation, namely: The active mode and the passive mode In the passive mode, the system goes into sleep mode while in the

active mode; the system is very much operational. During the passive mode, the system is set to a low power standby mode thus sending the system into a state of non activity; when signal is sent for a specific interval of time.

n the active state, the system receives input DTMF signals (control codes), processes it in accordance with the Program of the microcontroller. After processing the received signal, the microcontroller sends an actuation signal through the relay driver to the relay. This activates the relay so as to switch ON/OFF the devices connected to the relays. When an incorrect code is sent, the system does not perform any switching action.

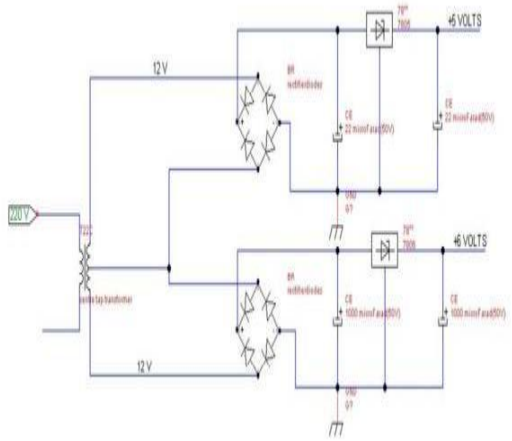

Figure 2. The power supply circuit.

RESULTS:

After construction the system was tested and the following was observed. The call from the user was answered by the receiver phone automatically (auto answer feature of the receiver phone must be enabled) after ringing for 5 seconds. The connected devices to the system turn ON/OFF in this order when the keys on the user's keypad were pressed.

When key '1' was pressed, the first relay was activated while the other relays remained inactive and the fan connected to it was turned ON.

When key '2' was pressed, the second relay was activated while other relays remained inactive and the socket connected to it was turned ON.

When key '3' was pressed, the third relay was activated while other relays remained inactive and the lamp connected to it was turned ON.

When key '4' was pressed, the first relay and second relay were activated while the third relay remained inactive and the fan and socket connected to them were turned ON.

When key '5' was pressed, the first relay and third relay were activated while the second relay remained inactive and the fan and bulb connected to them were turned ON.

When key '6' was pressed, the second relay and third relay were activated while the first relay remained inactive and the lamp and socket connected to them were turned ON.

When key '7' was pressed, the first relay, second relay and third relay were activated and the fan, the lamp and socket connected to them were turned ON.

When key '8' was pressed, the first relay, second relay and third relay were deactivated and the fan, the lamp and socket connected to them were turned OFF.

When keys '9', '0', '*', '#' were pressed nothing was observed. These results were based on the program of the microcontroller.

CONCLUSION:

By developing this Home appliance control system with its multi control feature which we are controlling with a cell phone, We have overcome the drawbacks of RF communication which

have a limited range as this system can control the home appliances from anywhere in the world. The main advantage of this system is that it is a simplest system with less complexity. A miss call will turn ON the device and again a miss call will also be used to turn OFF the device. Further research work can be tailored towards developing similar system that can remotely control complex electronic systems with high voltage equirements .Also, research efforts can also be geared towards developing similar systems that can the controlled remotely using voice prompts through calls instead of SMS.

REFERENCES:

1. *Chia-Hung Lien, Ying-Wen Bai, Hsien-Chung Chen, Chi-Huang Hung, (2010), "Home appliance energy monitoring and controlling based on Power Line Communication", International Conference on Consumer Electronics, ISBN: 978-1-4244-2558-7, ISSN: 2158-4001.*
2. *Hsien-Chung Chen, Chia-Hung Lien, Ying-Wen Bai, and Ming-Bo Lin, (2011), "Power Monitoring and Control for Electric Home Appliances Based on Power Line Communication", IEEE International Instrumentation and Measurement Technology Conference Victoria, Vancouver Island, Canada, May 12–15, PP: 2079-2184.*
3. *Kingsley Okeoghene Enalume, Emmanuel Okhueleigbe (2016), "Design and Construction of a Mobile Phone Based Home and Office Appliances Remote Switching System", American Journal of Embedded Systems and Applications, Vol No: 5, Issue No: 1, PP: 1-6.*
4. *Bishwajit Banik Pathik, 2 A.S.M. Ashraf Ahmed, 3 Labina Alamgir, 4 Abu Nayeem, (2014), "Development of a Cell Phone Based Vehicle Remote Control System", IEEE International Conference on Intelligent Green Building and Smart Grid (IGBSG).*
5. *C.G. Onukwugha & P.O. Asagba, (2013), "Remote Control of Home Appliances Using Mobile Phone: A Polymorphous Based System", African Journal of Computing & ICT, Vol 6. No. 5, PP: 81-90.*
6. *Oyediran Mayowa Oyedepo, Akande Noah Oluwatobi (2016), "Design and Implementation of a GSM based Electronic Appliances Monitoring and Controlling System", International Journal of Advanced Research in Computer and Communication Engineering Vol. 5, Issue 2, PP: 475-479.*
7. *ArmandoRoyDelgado, RichPickingandVicGrout (2012), "Remote Controlled Home Automation Systems with Different Network Technologies", Centre for Applied Internet Research(CAIR), University of Wales, NEWI, Wrexham, UK.*
8. *C.K.Das, M.Sanaullah, H.M.G.Sarower and M.M.Hassan,, Development of a Cell Phone based Remote Control System: an Effective Switching System for Controlling Home and Office Appliances", International Journal of Electrical& Computer Sciences IJECS- IJENS Vol:09 No:10, Pg. 23-29.*
9. *O. Oke, J. O. Emuoyibofarhe, A. B. Adetunji, "Development of a GSM based Control System for Electrical Appliances," International Journal of Engineering and Technology Volume 3 No. 4, April, 2013.*
10. *A.Z. Alkar, U. Buhur, "An Internet Based Wireless Home Automation System for Multifunctional Devices," IEEE Consumer Electronics, vol. 51, no. 4, pp. 1169-1174, 2005.*
11. *K. Reddy, F. Althobeti, Dr. Md A. Hussain and R. Reddy, "GSMControllable Power Switch System for Industrial Power Management", International Journal of Engineering Trends and Technology, August 2011*