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SMS based Remote Control System

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Abstract

A modern world contains varieties of electronic equipment and systems like: TV, security system, Hi-fi equipment, central heating systems, fire alarm systems, security alarm systems, lighting systems, SET Top Box, AC (Air Conditioner) etc., we need to handle, ON/OFF or monitor these electrical devices remotely or to communicate with these but, if you are not at the home or that place and you want to communicate with these device. So the new technology for handled these devices remotely and for communication to required the GSM, mobile technology, SMS (short message service) and some hardware resources. SMS based remote control for home appliances is beneficial for the human generation, because mobile is most recently used technology nowadays.

Keyword: *Mobile Phone, Micro-Controller, Short Message Service (SMS), Global System for Mobile Communication (GSM).*

I. Introduction

The new research areas for the need of the man that controlled the electrical devices remotely, anything from the home such as an air conditioner, security system, set top box, light, and so on. The case of remote control capability and the possibility of achieving it at a reasonably low cost have motivated the need to research into it not only for industrial application but also for domestic use or home use. Home wireless security systems are becoming increasingly popular and it is being a necessary nowadays. There are many benefits to using these compared to conventional systems. There are many products of Wireless Home Security Systems in the market. The price depends on how advance the system is. Normally today home security system is in wireless form rather than wired form. The reasons are wireless can saves cost of wiring, easy to install, occupy lesser space, easy for maintenance and more reliable. Besides that, the wireless also capability become as an appliances control in the home. The capability of controlling home appliances in a wireless and remote fashion has provided a great convenience to many people in life. Through a wireless remote controller, people can do remote operation without directly accessing the host of a home appliance. The home appliances like fan, lamp, television, washing machines and others. The introduction of the Global System for Mobile Communication (GSM) and particularly the use of hand-held mobile phones brought the innovation of distance communication at remote location. Based on this, research utilizes this facility for remote control of systems and appliances; take for instance, a man on a journey inside his car suddenly remembers that he left the Air Conditioner (AC), ON when it was supposed to be OFF. The normal condition is to drive back and switch OFF or for the home security we also monitor the home through the system but we are not include the option of the monitor in the system; in the system we consider only ON and OFF operation in (fig3.) . But with the GSM mobile phone in the hand, one looks on how the same could be used to effect control at any point and time.

Therefore in this project the GSM is the type of wireless that chooses. It is because it's the GSM is better than others wireless. It is suitable to install the systems that need a wide range. It also can monitor the signal strength and more adaptable. So it is suitable to become a controller for home appliances and for security system.

Nowadays, most couples leave for work early in the morning and get back only in the evening. Most people also have to travel to other cities for their work. When they are away, their house is empty and unguarded. Therefore case like theft and robbery is easy to occur because the home owners are not in the house. The Multidimensional crisis like theft and robbery is one of the most serious problems that happen in this country. The based solution is to develop home security system using a wireless to keeps your house safe from intruders and enables you to work in

peace. Based on the events above, the project can be developing to make our home secure and safe. We never anxious and worried anymore even we leave the house. So this system is to design and develop a home security system that can provide security against intrusion and other emergency situation by alarm via short message service (SMS). SMS stands for Short Message Service. It is a mobile technology that allows for sending and receiving text or even binary messages to and from a mobile phone [1]. With an SMS based computer control system, monitoring and control can be achieved at all times. This is as a result of the ease of accessibility that comes with the use of a mobile phone. To achieve an effective remote control and monitoring security system, today there are a many wireless home security alarm system available in the market. Some are designed for very high security level protection and some are basic type. Most of the alarm systems are very expensive and therefore not affordable by poor or middle class families. Some systems which cheaper in cost do not provide reliable features like status checking. To provide the public with a cost effective wireless security system, it is important to design a low cost system with advanced features which ease the benefits the people and also will decrease the crime. We are developing the system the control and monitor the home devices. It is important because the system can help the old persons, disabled persons and can help if there is no one at home. The aim of the proposed system is to develop a cost effective solution that will provide controlling of home appliances remotely and enable home security against intrusion in the absence of homeowner. The system provides availability due to development of a low cost system. The home appliances control system with an affordable cost was thought to be built that should be mobile providing remote access to the appliances and allowing home security. Though devices connected as home and office appliances consume electrical power. These devices should be controlled as well as turn on /off if required. Most of the times it was done manually, but it is a necessity to control devices more effectively and efficiently at any time from anywhere. In this system, we are going to develop a cellular phone based home/office appliance controller [2], [6].

II. Aim and Objective

The main aim and objective of the system is to develop an interface between the GSM and electrical appliances for the users, used the mobile phone and to access the home appliances or other electrical devices remotely.
The objective is to develop a system that allows for a user to remotely control and monitor multiple home appliances or electrical devices using a cellular phone or protocols. This system will be a powerful and flexible tool that will offer this service at any time, and from anywhere with the constraints of the technologies being applied. Possible target appliances include climate control systems, security systems, and lights; anything with an electrical interface. The proposed approach for designing this system is to implement a microcontroller-based control module that receives its instructions and commands from a cellular phone over the GSM network. The microcontroller then will carry out the issued commands and then communicate the status of a given appliance or device back to the cellular phone.

III. Existing System Overview

A. GSM / Mobile / Cell Phone Based Device Monitoring and Control System: The purpose of this system is to Monitor and Control any Digital or Analog devices from your Cell Phone. This system can be used to control up to 16 electrical devices. With this circuit you can switch-ON , OFF or Restart some Linux servers, ADSL modems, Printers, Door with electric lock, Irrigation Pump, Garage door, House lights, Water pumps, electric sunshade, Block the engine of your car or your motorcycle, at the steal case and much more. The purpose of this circuit is to make the human life better and easier.

B. GSM Based Automatic Irrigation Water Controller System: The purpose of this project is to get SMS alerts whenever the electrical power status changes to ON or OFF. Use your mobile phone to switch on/off the water pump from any location in the world.

C. Mobile technology (GSM) based remote monitoring and control of digital Energy meter: Useful for Electricity Department personal for remote meter reading. Also useful to disconnect the power supply to consumer incase of non-payment of electric bill. This is also used to exchange messages like power cut timings with the consumers.

D. GSM based Highway vehicle traffic monitoring system: The purpose of this project is to monitor the vehicles moving on highways at remote locations. This project uses infrared/laser sensor system to count the number of vehicles passing in both the directions. The vehicle count is logged by the microcontroller. This vehicles information is sent to the user over GSM modem. The information can be sent to the user periodically or can be sent on demand by sending a missed call or SMS.

E. EZY SWITCH: It is used for to remotely control and monitor your heating, security systems, and domestic /

commercial appliance. Ezy Switch is a simple switch control design that connects to electrical devices. If your appliance or equipment can be switched on or off, you can control it remotely from your mobile phone with Ezy Switch. Simple installation and control via text message The Ezy Switch employs the SMS network and comes with easy programming steps. Simple text messaging instructions are used for operation, such as "turn on heat pump" and "turn off heat pump" Monitor multiple devices Monitor your security lights and smoke alarms on one Ezy Switch, at the same time control the power on/off on your heat pump and hot water cylinder. Capacity of up to 8 monitored devices and 4 power controlled devices. It is works on all mobile networks that uses a globally compliant cellular module. It is working with following:

1) Domestic appliances – Remotely power on/off hot water cylinders, swimming pool pumps, and open gates.

2) Security – To control and monitor specified security systems, security light sensors, smoke alarms, security gates, and other wired peripherals.

3) Heating and ventilation – Remotely power on/off air-conditioning, heat pumps, central ducted systems, and ventilation systems.

4) Commercial Equipment – Receive alerts and notification from monitored equipment. Remotely operate lighting and other commercial peripherals.

5) Agriculture – Remotely control milk sheds, water pumps, monitor fuel tanks and irrigation equipment.

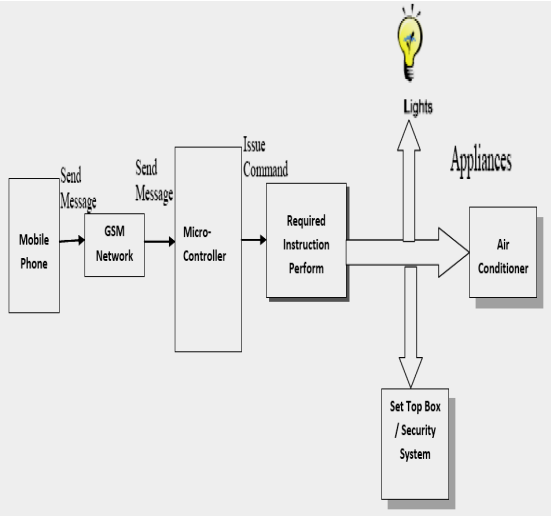


Fig. 1 Block Diagram of system

IV. System Architecture

In a fig 1 Illustrates the block diagram of the remotely home appliance control system using SMS. The Mobile Phone is integrated with the microcontroller (e.g. - PIC16F873A [9]) which receives SMS message from user Mobile Phone and sends a command to controller to control whether to turn ON or OFF the output. The Mobile Phone also sends status reporting to the user regarding the electrical appliance. The system utilizes a low cost microcontroller that is currently available in the market. The development of this device involves with both hardware and software to provide a preferable results. The structure of the system is working with following steps:

i) The remote user sends text messages (SMS) including authentication information and commands to the receiver.
ii) GSM receiver receives messages sent from user cell phone or mobile phone and send.
iii) GSM receiver decodes the sent message and sends the commands to the microcontroller.
iv)The microcontroller issues commands to the appliances.
v) Microcontroller issues commands to the appliances and the devices connected will switch ON/OFF.
vi)The Microcontroller checks for completion status and apply operation on Electrical Devices.
vii) GSM receiver informs the remote user of the outcome of their request by sending a completion status message back to remote user in the form of another SMS message.

A system used the following technologies:

A. Cellular phone, Networks and Communication protocols: The widely available networks are based on GSM. The network provides a wide area of coverage and can be utilized more cost-effectively for this system and communication protocols that are DTMF (Dual Tone Multi Frequencies) [3],[4] , SMS etc., SMS is the most efficient medium for communication. Mobile phone or Cellular device is required for to create a SMS.

B. I/O Interfaces between Microcontroller and devices: Serial or parallel I/O will be considered for to connect the GSM receiver and the Microcontroller. Using the microcontroller, a control circuit will be implemented to control the electrical appliances (air conditioner, security system, set top box, light, fan etc).

Microcontroller System

The micro-controller is a microprocessor with provisions for input and output embedded in it. It consists of timers, Analog to Digital Converters (ADCs), Universal Synchronous Asynchronous Receiver Transmitter (USART), etc. It is an 8-bit microcontroller with flash program memory and Electrically Erasable Programmable Read Only Memory (EEPROM). It contains 83-instructions which includes byte operations, bits-

operations and branching. It has five 8-bits ports which can be bit-wise or byte-wise addressed [10].
The three major features of the controller are:

i) Receives instructions and decodes them to give device address and command, then sends corresponding signals to the driver of the power circuit.

ii) Ensures dual independent operation action – device ON or OFF.

iii) Provides a feedback STATUS of any device under control whether ON or OFF.

The design parameters and steps are outlined as follows:

a) Read and store received key values in a First-In-First-Out (FIFO) buffer.
b) All commands ends with key **"5"** to execute the last four digits stored in the FIFO buffer.
c) Decode the first three digits to device address and the fourth digit to a command to be executed.

Design for switch ON, OFF and STATUS

For individual control of the devices, three digits address are allocated to them. A forth digit is added to determine which command is to be executed on the device. Then, the system uses a 5- digit instruction code as shown below in the fig 2:

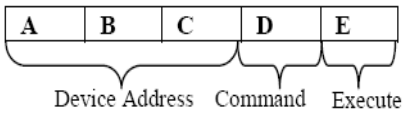


Fig. 2 Instruction Code Format for Devices

The instruction code determines if the device should be ON, OFF or the STATUS should be returned to the user.
The following are the codes for the commands:

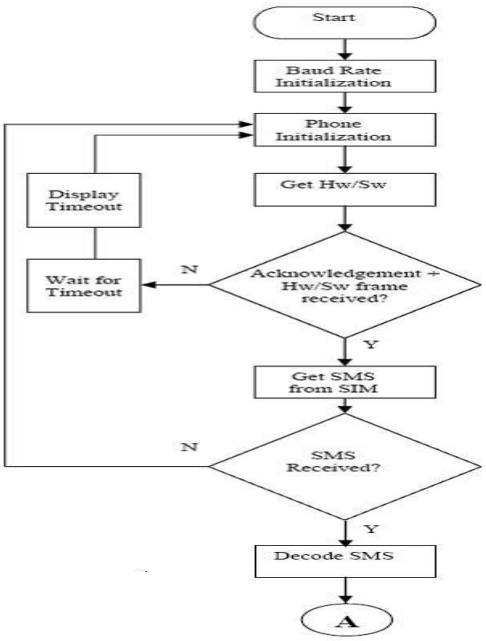
- "**2**" on the instruction code indicates that the device should be switched **ON.**
- "**7**" on the instruction code indicates that the device should be switched **OFF.**"**9**" on the instruction code indicates that the **STATUS** of the device should be returned.
- The fifth digit of the instruction is always "**5**" for execution.

Device	ON instruction Code	OFF instruction Code	GET Status instruction Code
1	27625	27675	27695
2	29625	29675	29695
3	62625	62675	62695
4	67625	67675	67695
5	69625	69675	69695
6	72625	72675	72695
7	79625	79675	79695
ALL	92625	92675	Not Available

Fig 3 Instruction Code for All the Devices

Design of the feedback (Device STATUS)
The system is programmed to give one beep when the device is OFF and five beeps when it is ON. At any point in time, this STATUS can be obtained

Algorithm
Step 1: Start
Step 2: Phone initialization
Step 3: Get Hardware Software
Step 4: Poll SMS from mobile phone
Step 5: If new SMS received go to step3 else, go to step1
Step 6: Receive SMS
Step 7: Check SMS pattern
Step 8: Control the device based on status
Step 9: Notify end user
Step 10: Go to step1



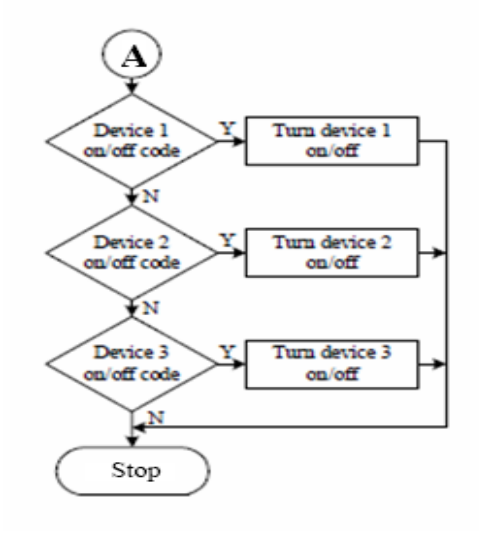


Fig 4.Flow of System

V. Advantages of a System

The system offer several attractive features like**:**

1. **Convenience** – SMS technology is easy to use and learn and can be accessed easily when needed.
2. **Accessibility** – instructions can be sent to the microcontroller to be controlled and monitored from any location provided there is the existence of an active GSM network or control from anywhere in world if cellular coverage is available.
3. **Portability** – a microcontroller can be controlled and monitored from any GSM phone that supports SMS. Considering the fact that most GSM phones support SMS, the system is therefore highly portable.
4. **Saves Time** – an SMS based remote monitoring and computer control system saves time as the user is not required to gain access to an internet connection or make a dedicated connection to the computer to be controlled as opposed to a Bluetooth-based system or an Internet based system.
5. **Cheaper** – SMS services are generally cheap and are sometimes provided for free (at least for certain periods) by service providers. Furthermore, most service providers do not charge users for receiving SMS.
6. **Mobility** – User and/or system administrators are more likely to have their phones with them at all times than they are likely to physically be in front of their computers. An SMS based system therefore enables them have ubiquitous access to the computer to be controlled and monitored.
7. Acknowledgement about execution of command from system to user.
8. To uses SMS and issue commands from user for control.
9. To alerts user on occurrence of any abnormal conditions like power failure, parameters.
10. To ease of implementation and cost-effective approach.

VI. Conclusion and Future works

SMS based remote control for home appliances is beneficial for the human generation, because mobile is most recently used technology nowadays. The SMS based remote control for home appliances is easy to implement the system that ON/OFF the electrical device through remotely via SMS or it handled more and more electrical devices which are use in home. In simple automation system where the internet facilities and even PC are not provided, one can use mobile phone based control system which is simple and cost-effective. Alternatively for such requirements landline phone with extension card could also be select for the system. In the next paper we are develop the audio or voice based and also include the text based (SMS) remote home and office control system. With the help of the audio or voice we can control the electrical devices or domestic or home appliances. Voice based approach is beneficial for physically handicapped persons or blind persons, with the help of speech we can control home or office appliances remotely.

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