GSM based single phase control system

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Abstract—**"GSM based Control System" implements the emerging applications of the GSM technology. Using GSM networks, a control system has been proposed that will act as an embedded system which can monitor and control appliances and other devices locally using built-in input and output peripherals. Remotely the system allows the user to effectively monitor and control the house/office appliances and equipments via the mobile phone set by sending commands in the form of SMS messages and receiving the appliances status. The main concept behind the project is receiving the sent SMS and processing it further as required to perform several operations. The type of the operation to be performed depends on the nature of the SMS sent. The principle in which the project is based is fairly simple. First, the sent SMS is stored and polled from the receiver mobile station and then the required control signal is generated and sent to the intermediate hardware that we have designed according to the command received in form of the sent message. We have selected a particular Nokia mobile set (Nokia 3310) for our project. The messages are sent from the mobile set that contain commands in written form which are then processed accordingly to perform the required task. A microcontroller based system has been proposed for our project. There are several terminologies that are used extensively throughout this project report. GSM (Global System for Mobile Communications): It is a cellular communication standard. SMS (Short Message Service): It is a service available on most digital mobile phones that permit the sending of short messages (also known as text messaging service).**

Keywords—GSM; Control system; SMS; microcontroller; appliances

I. INTRODUCTION

The new age of technology has redefined communication. Most people nowadays have access to mobile phones and thus the world indeed has become a global village. At any given moment, any particular individual can be contacted with the mobile phone. But the application of mobile phone can not just be restricted to sending SMS or starting conversations. New innovations and ideas can be generated from it that can further enhance its capabilities. Technologies such as Infra-red, Bluetooth, etc which has developed in recent years goes to show the very fact that improvements are in fact possible and these improvements have eased our life and the way we live. Remote management of several home and office appliances is a subject of growing interest and in recent years we have seen many systems providing such controls. These days, apart from supporting voice calls a mobile phone can be used to send text messages as well as multimedia messages (that may contain pictures, graphics, animations, etc). Sending written text messages is very popular among mobile phone users. Instant messaging, as it is also known, allows quick transmission of short messages that allow an individual to share ideas, opinions and other relevant information. We have used the very concept to design a system that acts a platform to receive messages which in fact are commands sent to control different appliances and devices connected to the platform. We have designed a control system which is based on the GSM technology that effectively allows control from a remote area to the desired location. The application of our suggested system is immense in the ever changing technological world. It allows a greater degree of freedom to an individual whether it is controlling the household appliances or office equipments. The need to be physically present in order to control appliances of a certain location is eliminated with the use of our system.

II. PROPOSED SYSTEM

Technology has advanced so much in the last decade or two that it has made life more efficient and comfortable. The comfort of being able to take control of devices from one particular location has become imperative as it saves a lot of time and effort. Therefore there arises a need to do so in a systematic manner which we have tried to implement with our system. The system we have proposed is an extended approach to automating a control system. With the advancement and breakthroughs in technology over the years, the lives of people have become more complicated and thus they have become busier than before. With the adoption of our system, we can gain control over certain things that required constant attention. The application of our system comes in handy when people who forget to do simple things such as turn ON or OFF devices at their home or in their office, they can now do so without their presence by the transmission of a simple text message from their mobile phone. This development, we believe, will ultimately save a lot of time especially when people don't have to come back for simple things such as to turn ON/OFF switches at their home or at their office once they set out for their respective work. The objective of this project is to develop a device that allows for a user to remotely control and monitor multiple home/office appliances using a cellular phone. 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 (but are not limited to) climate control system, security systems,

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 command 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.
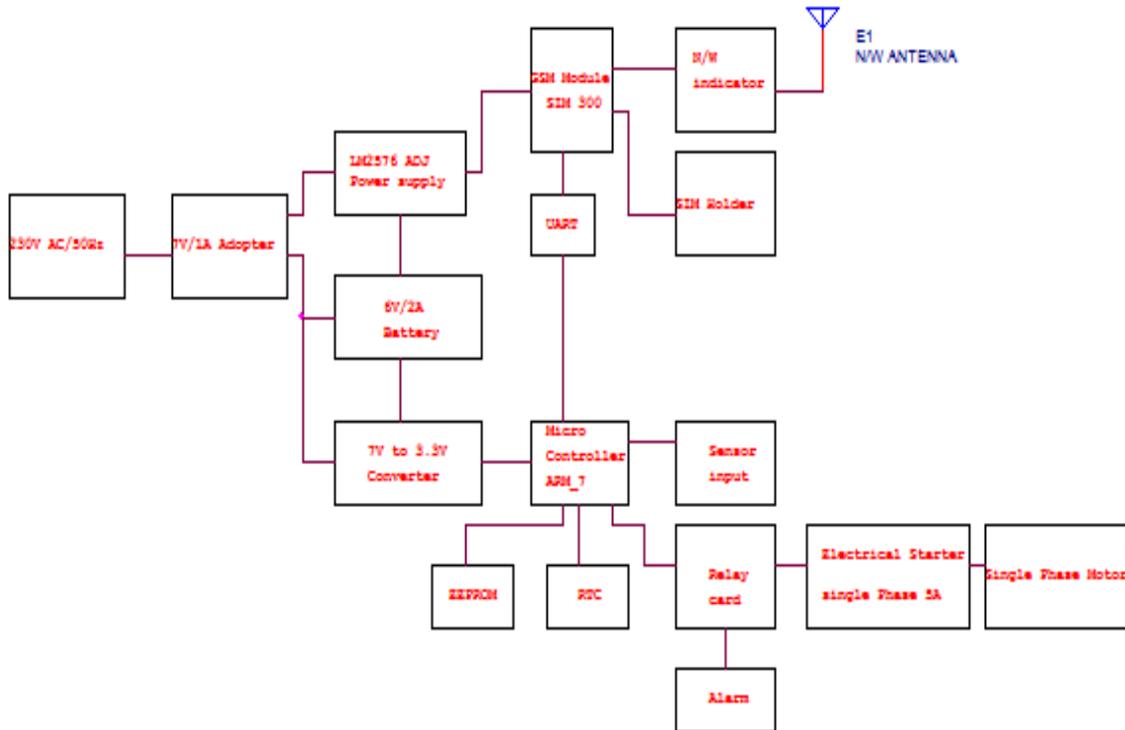
III. GSM BASED CONTROL SYSTEM

Fig.1: Schematic of the proposed system

Fig.1 shows schematic of proposed solution based on GSM technology. It is a simple illustration of how we have implemented our project and the various parts involved in it. From the above representation, the first Mobile station is used as a transmitting section from which the subscriber sends text messages that contain commands and instructions to the second mobile station which is based on a specific area where our control system is located. The mobile phone as indicated in the block diagram is a Nokia 3310 mobile set. The received SMS message is stored in the SIM memory of the phone and then extracted by the microcontroller and processed accordingly to carry out specific operations. The relay driver (BUFFER ULN2003) is used to drive the relay circuits which switches the different appliances connected to the interface. The input from different sensors are feed to micro-controller and processed to operate respective task semi autonomously and autonomously.

A. Operation flow diagram

Assuming that the control unit is powered and operating properly, the process of controlling a device connected to the interface will proceed through the following steps:

1. The remote user sends text messages including commands to the receiver.

2. GSM receiver receives messages sent from the user cell phone.

3. GSM receiver decodes the sent message and sends the commands to the microcontroller.

4. Microcontroller issues commands to the appliances and the devices connected will switch ON/OFF.
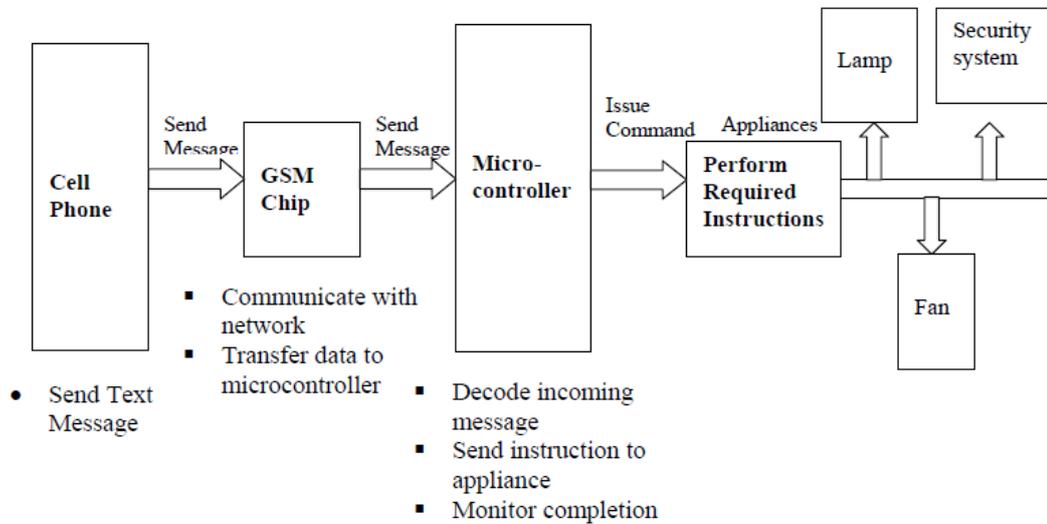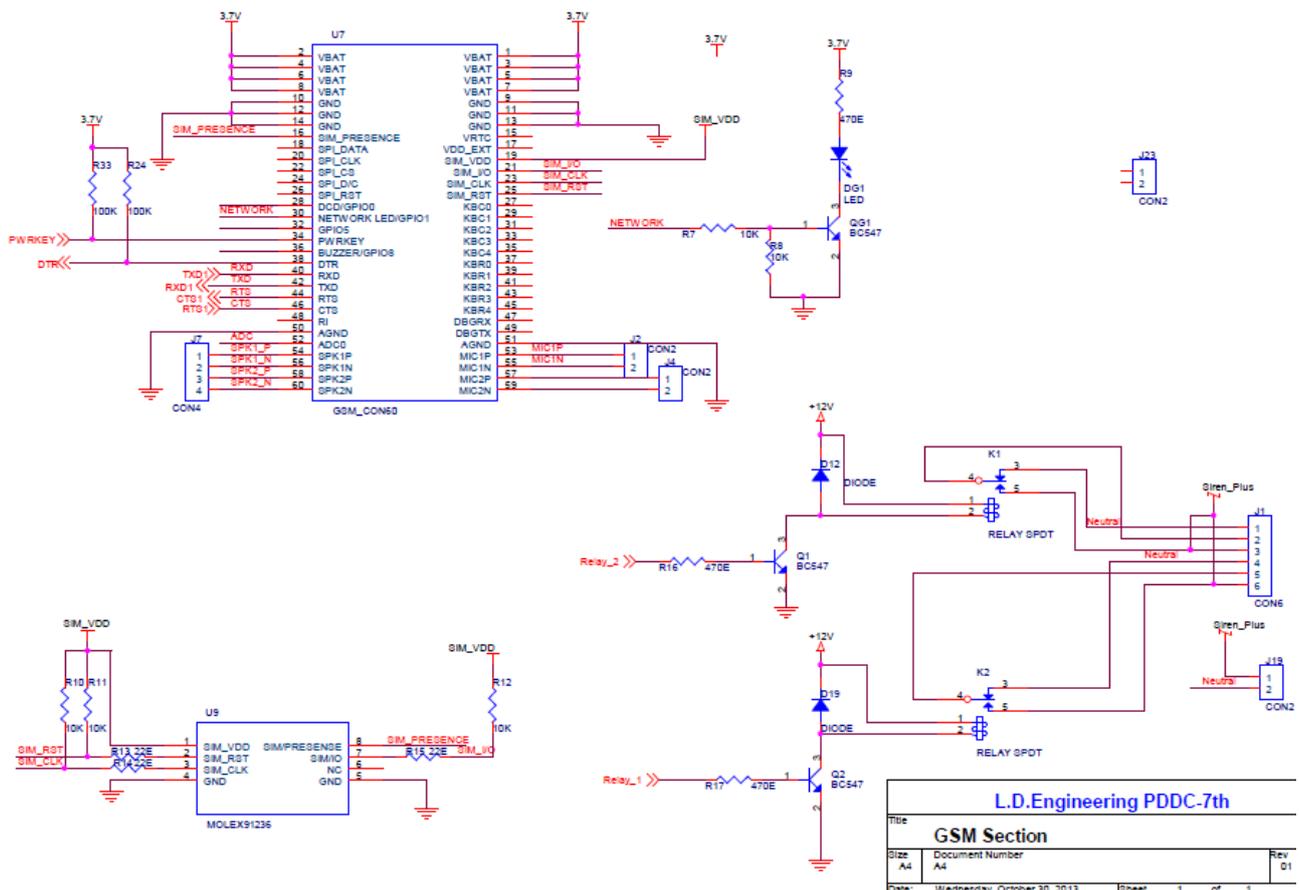

Fig.2: Flow of operation of the system

B. Schematic diagram of GSM section

C. Electronic Circuit

Fig. 3: Electronic circuit for interfacing

D. Relay driver

The relay driver is used to isolate both the controlling and the controlled device. The relay is an electromagnetic device, which consists of solenoid, moving contacts (switch) and restoring spring and consumes comparatively large amount of power. Hence it is possible for the interface IC to drive the relay satisfactorily. To enable this, a driver circuitry, which will act as a buffer circuit, is to be incorporated between them. The driver circuitry senses the presence of a "high" level at the input and drives the relay from another voltage source. Hence the relay is used to switch the electrical supply to the appliances. From the figure when we connect the rated voltage across the coil the back emf opposes the current flow but after the short time the supplied voltage will overcome the back emf and the current flow through the coil increase. When the current is equal to the activating current of relay the core is magnetized and it attracts the moving contacts. Now the moving contact leaves from its initial position denoted "(N/C)" normally closed terminal which is a fixed terminal. The common contact or moving contact establishes the GSM Based Control System connection with a new terminal which is indicated as a normally open terminal "(N/O)". Whenever, the supply coil is withdrawn the magnetizing force is vanished. Now, the spring pulls the moving contact back to initial position, where it makes a connection makes with N/C terminal. However, it is also to be noted that at this time also a back emf is produced. The withdrawal time may be in microsecond, the back emf may be in the range of few kilovolts and in opposite polarity with the supplied terminals the voltage is known as surge voltage. It must be neutralized or else it may damage the system.

IV. CONCLUSION

The project we have undertaken has helped us gain a better perspective on various aspects related to our course of study as well as practical knowledge of electronic equipments and communication. We became familiar with software analysis, designing, implementation, testing and maintenance concerned with our project. The extensive capabilities of this system are what make it so interesting. From the convenience of a simple cell phone, a user is able to control and monitor virtually any electrical devices. This makes it possible for users to rest assured that their belongings are secure and that the television and other electrical appliances was not left running when they left the house to just list a few of the many uses of this system. The end product will have a simplistic design making it easy for users to interact with. This will be essential because of the wide range of technical knowledge that homeowners have.

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