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Study on Automatic Load Control

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ABSTRACT: Because of the advances in wireless technology and automation industries, more innovative and creative ideas need to be created. This has contributed to the remote monitoring and control of machines. In a system that performs the role of monitoring and control of devices and loads remotely, a wireless system for home automation has been suggested. This suggested scheme is cost-effective. A network has been developed with the help of such automated systems and links peripherals equipment and chip bearing appliances which are smart and various other subsystems. Thus there is control of electricity operation real time remotely. Implementation of these systems will need radio link communication or wired communication for directing the devices as per the need and requirement. Radio link communication as well as wired communication has a few limitations such as restriction in range, lower data rate, higher cost, arranging software, deploying wires

KEYWORDS: Mobile, Control, Automation, Global System for mobile communication, Wireless Network, Interactive Voice Response System, Short Messaging Service.

I. INTRODUCTION

In the domain of automation, one key and deciding factor for proper running is wireless technology. With the arrival of technology and introduction of automation systems which were working on networks, it is possible for monitoring and controlling of devices remotely. It is possible to do so if various technologies such as Bluetooth, DTMF, and ZigBee are used. These automated systems have expanded rapidly and have high potential for accession and it will help in proper organizing the devices and appliances as per convenience. A network has been developed with the help of such automated systems and links peripherals equipment and chip bearing appliances which are smart and various other subsystems. Thus there is control of electricity operation real time remotely. Implementation of these systems will need radio link communication or wired communication for directing the devices as per the need and requirement. Radio link communication as well as wired communication has a few limitations such as restriction in range, lower data rate, higher cost, arranging software, deploying wires. Thus a GSM based system which is IVRS incorporated that has enabled users in controlling and monitoring the appliances and loads remotely. Home automation systems based on GSM have been developed and then implemented that make use of already evolved and executed cellular systems based on GSM. The mobile based in GSM can be used as a device for commanding and thus the transceiver will not be required. Thus, apart from the user guide, no extra device needs to be purchased. The network of GSM has communication based on radio waves that is capable of transmitting information real-time for monitoring and controlling the devices remotely. The IVRS enables the user to interact for ease of operation. Because of larger networks and more coverage of mobile industry than that of local area networks, it is easier for the user to organize the system through portable phones. In Fig. 1, the various components of the proposed system is given in the form of a block diagram [1].

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In the microcontroller, a set of instructions to turn on and turn off the required devices are already set. For a particular command, a symbol or a combination of symbols has been already assigned in the keypad. To control any device, a call needs to be made on the SIM number of the consumer and then a pre-recorded voice is sent to the user by the interactive voice response system. For example: Press 1 for turning on the load, Press 2 for turning off the load. Based on the requirement, the user will choose an option by using the control unit which is further sent to the appliance control unit through the global system for mobile communication. All these commands are decoded in dual tone multiple frequency and then sent to the decoder of frequency[2]. Then the function of MCU here is to further these instructions and then sent over to the circuitry of the relay which will take further action as per the requirement. Thus by following all these steps, the particular device or appliance will be turned ON or OFF and corresponding messages will be sent to the user through GSM technology. The units mentioned in the block diagram are discussed in details such as module of GSM:

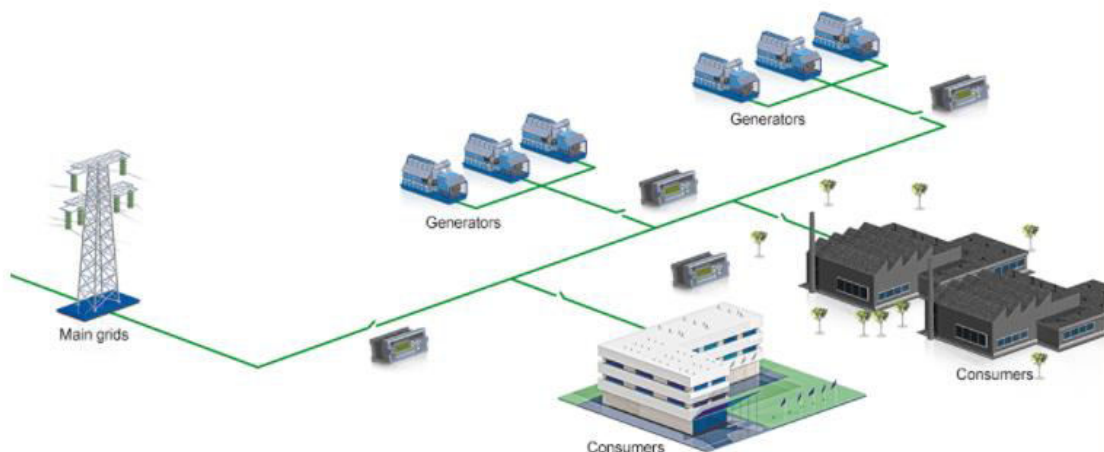


Figure 1: Diagram Used to Show Wirelessly Load Sharing

The delay generated throughout in the execution of a command involving single control is given. The equation for calculating the complete latency of the system implemented is given[3].

The module used is GSM sim300 which finds application in various areas such as SMS alerts, remote control, and sensor monitoring. Interfacing of the model is done with the commanding unit via a RS232 interface. This unit serves two purposes. One is establishing a proper connection between the user and the ACU via radio link of the network. Other is providing details about the ON or OFF status of the device. As soon as the module of GSM gets any call, the function of the system is verifying password authentication of the user and only the authorized user is contacted through the GSM. Then the user will receive the required voice messages containing the set of instructions that he or she needs to carry out through the GSM network. The commands selected by the user are then transmitted to the decoder of DTMF and an action for controlling is carried out according to instruction(s) sent by the user[1]. If there is any modification required in the parameter, then the main control unit will be interrupted for updating the status of the modification that has been done by the user. If the modification is done over a call, then the data is provided over by the interface of RS232. The module of GSM does not store any command and thus each command is treated urgent and immediate action is taken on that. Module

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for transmitting and receiving: If more than one ACU are present than a transceiver module for transmitting and receiving data between the various ones which aids in execution and termination of the existing commands. For this purpose, a CC1000 UART module is used which is an ultra-high frequency transceiver for lower voltages and lower power. The ALC Automatic Load Controller is an integrated part of DEIF power management systems. In case of generator drive when the mains grid is not available, it may be necessary to control the system load. When the ALC is placed in a section of the system, it will be capable of controlling up to 8 consumer feeder breakers[4].

One system can hold up to 8 ALC units, giving the possibility to control up to 64 feeder breakers. For each feeder breaker, the control can be based on a fixed power consumption value for the consumers connected to the feeder, or it can be based on a power measurement feeding a 4-20 mA signal into the ALC units[5].

Based on the power calculation in the system, the ALC's can automatically connect and disconnect consumers in a pre-determined order. This means that if a generator is tripped for any reason, the system will calculate the power flow and disconnect the necessary number of consumer feeders in order to prevent overloading the plant. If a generator has been taken out and is made available again, the system will calculate if the generator is necessary to feed the system. If so, the generator is started and, when online, the consumer feeders will connect[6].

II. LITERATURE REVIEW

Authors Afshan Mulla, Jaypal Baviskary, Jeet Desai, Chandrashekhar Beralx and Anagha Jadhav performed implementation of a system that incorporated the technology of GSM and IVRS for serving the purpose of monitoring and controlling the devices remotely. It does not need a transceiver because of a GSM based system [1]. Authors Carelin Felix and I. Jacob Raglend have done review of the existing automation system for homes and also the areas of hindrance in adopting these technologies. Further a novel architecture has been proposed and implemented by making use of technology of Zigbee [2]. Authors Seong Phil Hong, Jaypal Baviskar, Afshan Mulla, Amol Baviskar, Jeet Desai have implemented how it exploits the public switched telephone network that reads the remote control of various devices by making use of a DTMF based system and gives support to parallel connection. A secured technique has been given for managing loads and devices by incorporating the DTMF principle [7].

III. CONCLUSION

The system proposed has made usage of the latest technology in helping the used in controlling, operating the various appliances and devices in real time and from a remote location. It can be seen as a major solution to the problems that arise when the person or owner of the house is far away and cannot monitor or control the devices of appliances in real time. A proper design and implementation has been proposed in the paper of the home automation system based on the technology of GSM. The usage of emerging technology of Interactive voice response systems has been proposed and discussed in which the user can send his instructions through voice messages. Also the latency that is generated in the system because of execution and operation is calculated and analysis has been done. The future work that can be done is that new technologies and equipment's should be developed which can reduce the latency produced in the overall operation. Thus system based on IVRS helps in aiding the user in monitoring and controlling the loads and devices remotely. While writing down the equations, n number of bits are taken into consideration. The sum of delay due to any call at the GSM leads to a delay of an average of four seconds. The delay in propagation is varied as per the distance between users from cell size and BTS. For a size of a cell of thirty kilometers, the delay of propagation is around 0.1 millisecond. A delay of further 0.3-0.6 milliseconds is added because of processing time. Rest delay is caused because the incoming signal is sent to all the users. The user will

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also take time in putting username and password and thus introduce some latency. For execution of commands and programs sent to the memory will also take up some time. Thus there is a latency of around 6-10 seconds in execution of first control operation.

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