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Smart control of Electronic Appliances and Digital Notice Board using GSM and Bluetooth

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ABSTRACT- *The project presents a digital notice board and electronic appliances control by using GSM and Bluetooth. By this idea the users can be provided with a simple, fast and reliable way to put up important notices in an LCD where the message can be send by the user to be displayed in the LCD. The message can be sent through an android application designed in this project. Similarly, a home automation system has been developed where home appliances like light, fan etc. can be switched on or off using the same android application designed in this project. So, using the android application, controlling the home appliances can be done and notices can be put up in an LCD display from any location in the world. It uses Arduino-2560 board to control the appliances and notice by the GSM technology, Real Time Clock (RTC), Temperature and Humidity sensor, Bluetooth system, Relay and an android application for user interface with the hardware. The device can be used anywhere irrespective of the place of deployment provided mobile network connectivity is available.*

Keywords: ***Android, Relay, Arduino-2560 board, RTC, Bluetooth***

1. INTRODUCTION

In this project, a hardware capable of controlling electronic appliances and displaying notices electronically using an android application has been built. So, the hardware can perform broadly two functions. For controlling home appliances, the system can be used in much different kind of situations where as user can switch on/off any home appliance connected to it from anywhere using an android application installed in a smartphone. In order to display notices, a user can use the same application to type a notice and click on the send button to get it displayed. Both the functionality can be used only if sufficient balance amount is left in the user's SIM card since each access transacts a fixed amount for SMS. The motivation behind such a project is mainly to reduce physical effort for operating appliances especially for aged people. Also, it might help a person to save energy by switching off appliances on being out of home or to switch on appliances to get services like washing clothes, cooling room, heating water done by the time he reaches home. Another reason for this project is over usage of paper in educational institutions for printing notices. Due to mushrooming paper usage day by day, lot of trees is being cut which is harmful for the environment. So, if notices are displayed everywhere electronically, it would reduce paper usage and make communication easier and faster.

2. LITERATURE SURVEY

The automation systems developed earlier includes "GSM BASED SMART HOME AND DIGITAL NOTICE BOARD" [1], however, it uses an ARM microcontroller for system control and GSM technology for communication, so it can control only less appliances load. The home automation systems developed earlier includes a PIC16F887 IC integrated with GSM module enabling SMS based automation [2], unlike this project, did not use any android application in it and involved extra task of writing message.In [3], Elkamouchi also gave a prototype of Smart home and used sensors and actuators for the home appliances to get them connected to microcontroller. Another smart home was built in [4], where Xbee was used for communication instead of GSM. In 2011, a Wireless remote power controller was built in [5], which could control power consumption in a home through TC35 module. Han in [6], built a smart home energy management system using IEEE 802.15.4 and Zigbee module for communication. A computerized system was developed in [7], where a GSM was interfaced with a desktop computer. Home appliances had wired connection with desktop and users were connected through Wi-Fi. Doors and Windows were monitored in [8] using PIC18F452 with security that required ID for entering through the door.

COMPONENTS

The components used in the project are

A. Arduino Mega development board

The arduino mega is a micro controller board based on the ATmega 1280.It has 54 digital inputs/output pins, 16 analog inputs, 4 UARTs, a 16 MHZ crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything that needed to support the microcontroller; simply connected to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

B. GSM SIM900 Module

A GSM SIM900 module has been interfaced with the arduino processor co The module contains a SIM card holder, an antenna for sending/receiving signals to the SIM and an LED as a status for power, signal and incoming call. It supports features like data/fax, GPRS and SMS at both 900 MHz and 1800 MHz. Serial port baud rate is adjustable from 1200 to 115200 BPS (bauds per second). It receives only incoming calls to its SIM from the users through the antenna.

C. 20*4 Alphanumeric LCD display

This LCD has been used to display the notice sent by the user. It is a 20*4 screen which means it can display 20 alphanumeric characters in each line and there are four lines for display in total which sums up to a maximum of 80 characters being displayed at a time. It has 8 data pins since each character is of 8 bits and three other pins namely, enable, read/write and register select. Whenever the enable pin is low, LCD is OFF and it is ON if the pin is high. The read/write pin, if high, reads the data from LCD and if low, writes data in it. The register select pin decides the type of data transferred through the data pins. If it is high, a character is written in LCD and if low, command is sent to LCD.

D. Relay

A relay to drive a dc motor has been used. In order to control a circuit by a low-power signal with electrical isolation between control and controlled circuits, relay is used. Relay isolates low current circuit from high current circuit and the low current circuit either makes or breaks the high current path through the switch.

- On clicking an ON/OFF button, an SMS is generated and sent by the application Home Automation to the SIM in GSM module.
- On receiving the message as commands the appliances can be controlled based on the

E. DC Motor

A 500 rpm 12V DC motor has been used for home automation purposes.

F. Android Application

An application named automation system has been developed such that the user can select the mode of automatic or manual and if automatic mode is been chosen then the Bluetooth and GSM mode can either be selected and based on that the control shifts to indoor control or outdoor control has been used to switch on/off dc motors using on/off button and another button for typing and sending a notice to be displayed in the LCD.

G. Smartphone with android operating system

A smartphone Moto E 2nd generation with android version 4.2 Jelly Bean has been used for running the android application named automation system.

4. SYSTEM DESCRIPTION

The Arduino microcontroller receives an SMS through the GSM module on occurrence of one of the two events: when a notice is sent by a user through application; user clicks on ON/OFF button in the application. And the Bluetooth module HC-05 which can be switched on such that the indoor Bluetooth control can be done with an application by setting the command as 1 for ON and 2 for OFF for loads respectively

I. Digital Notice Board

- When the SIM inserted in the GSM module receives a notice as an SMS from a user, it saves the SMS and by this the messages can be displayed to the notice board
- On receiving the data from the GSM it gets written in the LCD 20*4 display and so it gets communicated easily and quickly

II. Home Automation

commands which is send by the user and the load status can be updated in the LCD display which is known as the notice board

- The appliances automation can also be done by the Bluetooth control as indoor control for the physically challenged people

5. SYSTEM WORKING

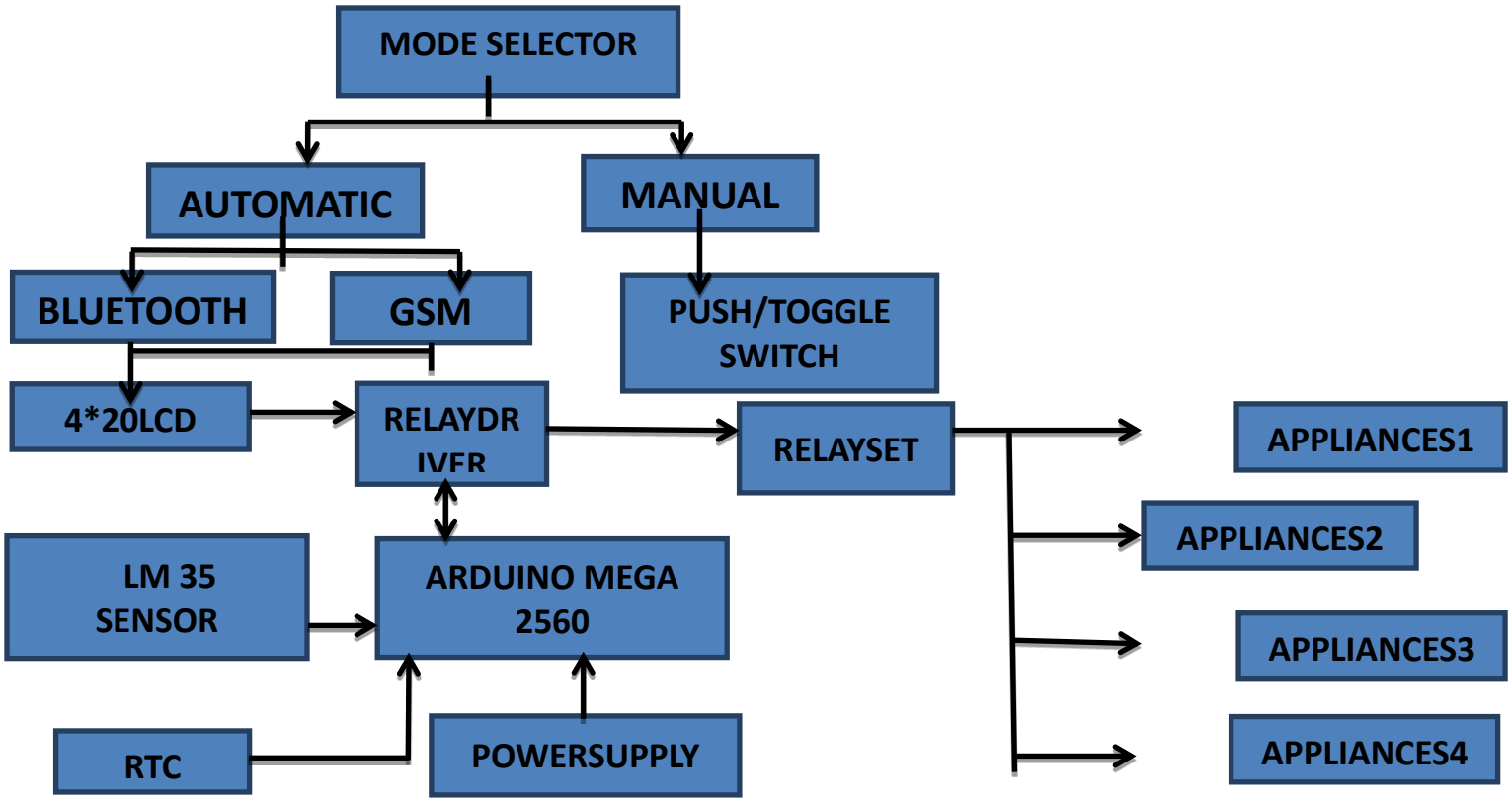


Fig No. 5.1 Description for controlling electrical appliances and digital notice board

An Automation system is been developed to control the electrical appliances and the notice board digitally, so an android application is been developed to control the hardware system by which the android application which has different modules. The first module is the mode selector which the user selects the manual mode or automatic mode, if the user enables the automatic mode it redirects to either GSM control or Bluetooth control and if the user clicks the GSM mode in which the outdoor control of appliances can be done and also the control of digital notice board can be done by using the GSM mode and if the user enables the Bluetooth mode the indoor control of home appliances can be done respectively. The devices can also be controlled through any mode even it is turned on or off using another mode. The digital notice which has the typing screen for the display of messages this can be done by using GSM mode by which communication can be done easily and quickly. The automatic control of electronic devices can reduce the human work and time consumption. It also minimizes the unwanted power consumption.

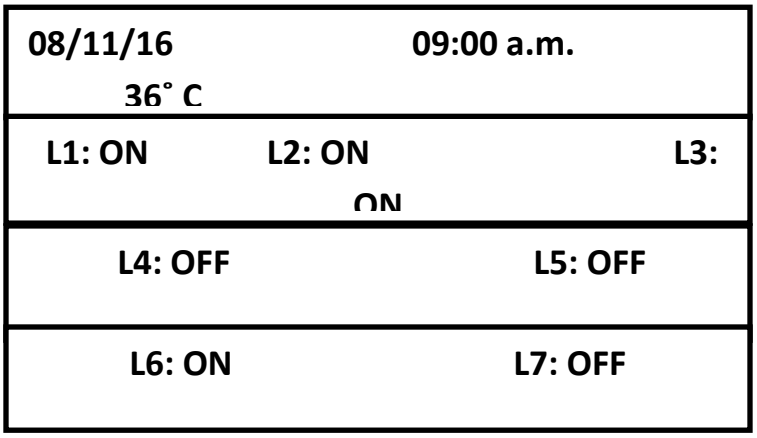


Fig No.5.2Load control for appliances in LCD

This notice board which can able to display the load status of the appliances and also with the help of the LM 35 sensor the temperature of the room can be identified

easily and with help of the Real Time Clock in the system which enables the user to know the current date and time.

08/11/16	09:00 a.m.	36˚
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING		
TODAY'S (05/11/16) MEETING IS		
POSTPONED TO 08/11/16 (TUESDAY)		

Fig No. 5.2.3 Display of messages in the LCD

The digital notice board of 4*20 size can be used to display 80 alphanumeric characters in 4 rows correspondingly and it has the multipurpose use that it has the ability to display the messages for communication easily and quickly thus it makes the human lifestyle more sophisticated.

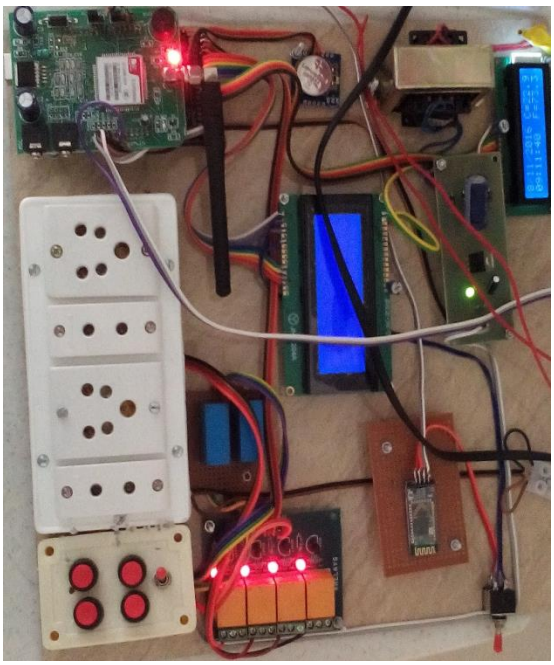


Fig.no.5.3. Snapshot of hardware system

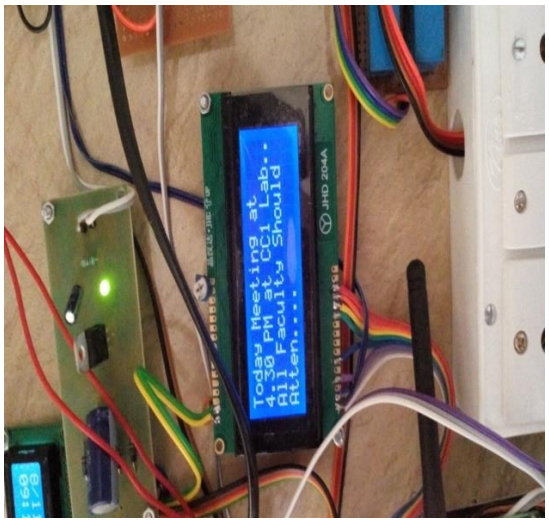


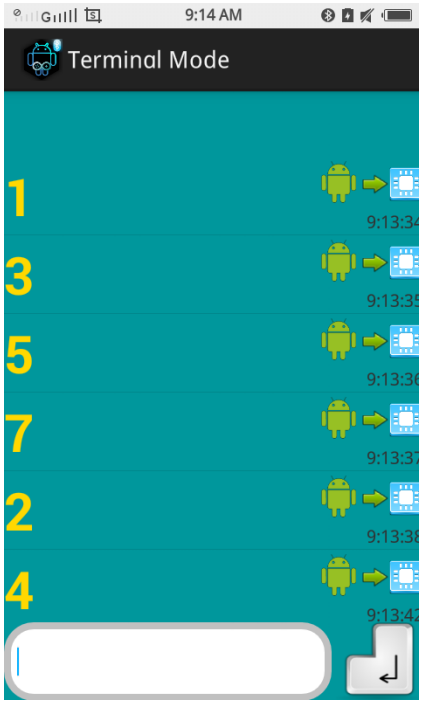
Fig.no.5.4.Notice Board control GSM and Bluetooth

6. MODULE DESCRIPTION

- MODE SELECTOR
  It enables the user to select the mode as manual or automatic to the user
  By selecting the Manual mode the user can control the appliances manually.In Automatic mode the user can control the appliances and digital notice board by using the application

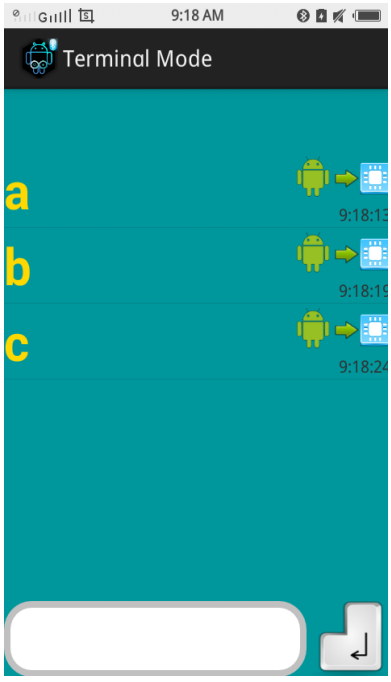
- AUTOMATIC MODES
  This automatic mode which is compromises of both Controller mode and Terminal mode by which the user can select the mode of automatic control as GSM control and Bluetooth control

- TERMINAL MODE
  Terminal mode is a GSM module which has control for appliances or the notice board. The user can control the electrical appliances by giving the input as numbers and the digital notice board by using alphabets



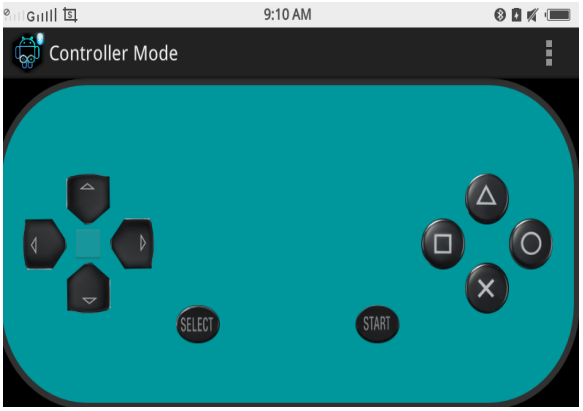
- TEXT BOX FOR NOTICE BOARD

If the user selects the notice board button it automatically redirects to the text box area where the user can type the message and send it which can be displayed in the notice board



- CONTROLLER MODE

The Bluetooth application which helps the user to control the home appliances as indoor control.In this the appliances can be controlled by setting the commands for switching ON and OFF the devices



7. CONCLUSION

This automation system with GSM and Bluetooth system is designed and developed for the welfare of the human beings. The control system can be the betterment in time consumption; the system can easily control the hardware by use of android systems which are commonly used by all the people. This project provides the advantage for users in home automation system and control of notice board digitally.

8. FUTURE WORK

As the GSM which is not cost effective as it costs for sending a message to the control system and Bluetooth which can be provided for only certain ranges. So to overcome these disadvantages the internet based automation system can be done, this also helps the user to control the system from remote places and it can be cost effective thus a website can be developed by which the appliances can be controlled by using the internet which can be cost effective correspondingly.

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