Home Appliances Control using Android Application

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Abstract

Effective and reliable predefined Arduino programming’s. And then it control the switching of the Home Appliances. Here the microcontroller and smart phones are connected via Bluetooth modules, which are present in both the smart phones and in the controlling circuit. The Bluetooth is a wireless technology used for sharing the data in between the Android phones and the Arduino board. The Bluetooth module with Arduino is used to control the home appliances wirelessly and Arduino and the relay drivers are used to switch the devices like switching lights, fans or TV on/off. In this way by using this system in this paper, we can control all the required home appliances wirelessly, from the any corner of our homes (which are in the range of Bluetooth modules), And thus this paper provide us a very way of Home Automation System.

Keywords- Arduino Uno, HC-05 Bluetooth Module, Home Automation and smart phone.

1. INTRODUCTION

The main purpose of any automated system is to reduce the human labor, efforts, time and human negligence. With this system we can control our home appliances very finely. This paper is designed to control the home appliances using an Android Application with the help of a text message sending through the mobile phones. Moving away from the traditional method like keyboard or switches to control the devices here we are using a method of sending a text message with The Automation is a very trending topic in 21st century, and playing a very important role in our daily lives. The automated system is widely used to reduce human labor, efforts, time and errors due to human negligence, and that’s why it is used very widely in our society. Today everyone is having their own Android phones, and the people are using many Android Applications in it. And that’s why, this paper presents microcontroller based text controlled Home Automation System using smart phones. This system enables the user to have a control on every appliance in their homes, as per the user requirement. The system consists of a smart phone and a control circuit. The control circuit consists of Arduino UNO Microcontroller, which processes the user commands which are in the form of text messages. It compare that commands with the the help of our smart phones towards the home appliances, wirelessly with the help of Bluetooth technology and using an Android Application. The foremost aim of this technology is to increase efficiency and reduce the efforts. With the advent of 'Internet of Things' in the last decade, we have been pushing for ubiquitous computing in all spheres of the human interfacing with technology. Automation has an aim to achieve the simplicity with the most efficiency. In this 21st century everyone is well familiar with the use of the smart phones and the Android Applications. By just writing a text message we are controlling our so many home appliances, in this technique. This system provides the simplest way for making our home as an automated home and an Android Application based home. And hence this home automation system is getting much popularity day by day due to their ease of use and wide operations capabilities. Also the system is very flexible and hence we can control number of home appliances with the help of the system as per the requirement of the users. The main objective of this project is to control the home appliances without any physical activity i.e. by operating only the mobile phones. This can help the handicapped person very much by reducing their physical activity. Thus it provides the maximum ease and safety to that handicapped peoples. Previously the Same Home Automation System was made with the help of the technology like voice controlled home automation system. But in this system the problems are occurred due to the frequency interfacing of the two or more voice signals interfere with each other if we are going to control the number of home appliances at the same time. Hence this system was not that much accurate.
So that problem we can overcome by using this system of Home Automation using text messages.

2. LITERATURE REVIEW
IEEE paper ‘Design of Intelligent Voice Controlled Home Automation’ by sonali SenShamik Chakrabarty in the international journal of computer (0975-8887) Volume12115, July 2015. This paper gives the information of how to control the devices using Bluetooth and Android Application. The Voice Recognition Based Home Automation System For Paralyzed Peoples, published by Mukesh Kumar, Shimi S.L. in International Journal of Advent Research in Electronics and Telecommunication Engineering Volume4, Issue10, October 2015. This paper presents the design of a text message based Home Automation System for physically challenged people suffering from paraplegia (who cannot move their limbs but can speak and listen) to control home appliances.

3. PROPOSED SYSTEM

The Block diagram of the system is shown in above fig. There are total 7 blocks namely Arduino, Bluetooth Module, Android phones, LCD, Relays, Power Supply, Home Appliances (TV, Fan etc.). And Arduino is the main block of the system which is the controller or programmer by using android phone we can control the home appliances by using the Bluetooth technology. LCD is used for displaying the output status. Means whether the particular home appliance in this system is ON or OFF that is indicated on the LCD. After that we are using the relay drives in this system. Relay drivers are used for switching purpose just for making ON and OFF of the home appliances. And a text message is send towards the microcontroller to ON or OFF the home appliances. That text message is the compare with the predefined messages in the controller. The Bluetooth adapter which is present in the Android phone is configured to send this text to the Bluetooth module on Arduino Uno board that would in turn control the electrical appliances through the relay boards. The brief description of each device is as explained below.

3.1 Hardware Components
- Arduino Uno
Arduino Uno is a microcontroller board, based on ATmega-328. It contains 14 digital input/output pins, 6 analog inputs, 16 MHz ceramic resonator, USB connection, power jack, an ICSP header, and a reset button. It has everything which is needed to support the microcontroller. We can connect this Arduino board to computer via USB cable, or power it using AC-DC adapter. The Arduino circuit is an interface between the software and hardware part of the project. Here the Bluetooth module is transmitting the text to Arduino Uno serial port. That text is matched against the various combinations of the predefined texts to on/off the home appliances. The name of the appliance and the on/off commands are stored as the predefined commands, e.g. to switch on the television the user needs to say ‘television on’ and to switch off the television user need to say ‘television off’. The appliances are connected via relay board to pin numbers 2, 3 and 4 of Arduino Uno. And the corresponding pin number has given a high or low signal to on or off the appliances respectively when a matching of texts is detected. The Arduino Uno is the most efficient AVR series microcontroller. It provides most of the important features of the microcontroller. It also has the Analog pins to get the analog input to the Arduino and thats why it is used in the system presented in this paper.

- Android Phone
Android is a mobile operating system (OS). It is based on Linux Kernel and it is developed by Google. With a user interface based on manipulation, the OS uses touch input and it loosely correspond to real world actions such as swiping, tapping, pinching, and
reverse pinching so as to manipulate the on screen objects and also the virtual keyboard. This Android platform is chosen because of its huge market globally and it’s easy to use user interface. The Android Applications are extending the functionality of the devices. And using Android Software Development Kit (SDK) they are primarily written in the Java programming language. The text recognition is the inbuilt feature of the Android phone is used to control the required home appliances.

The text message is send to on/off the appliances. Then the Bluetooth adapter is present in this Android phone is used to send this text to the Bluetooth module on the Arduino Uno board. And then it controls the home appliances through the relay board which is present in the system simply to ON or OFF the particular home appliances at required time by the user. Then the appearance of the user interface is also the important thing to recognize the application.

Bluetooth Module

The Bluetooth is a most efficient wireless technology which is used to communicate the data between the devices. But the devices are in the range of Bluetooth modules, which are at short distance from each other, (using short wavelength UHF radio waves in ISM band from 2.4 to 2.485 GHz.) from the fixed and mobile devices and building the Pans. This Bluetooth module allows us to transmit and receive the signals. This Bluetooth modules are present on both the control circuit and in the android phone. The Bluetooth module in smart phone receives the text from Android phone and then it transmits that text to the serial port of Arduino Uno board.

Fig 3. Android Phone

The text recognition is the inbuilt feature of the Android phone is used to control the required home appliances.

Fig 4. Bluetooth Module

- Relay Board

The relay is nothing but an electromagnetic switch. It is operates only after current applied to it. It is used as a switch on our circuit. The different type of relays operates on the different voltages. It has to consider the voltage which is to be triggered when the circuit is closed. In this paper the relay circuit is used to turn on/off the home appliances. Initially the high/low signal is applied from the Arduino Uno. When the low voltage is given to the relay of any particular appliance then that appliance is turn off and vice versa. There are four appliances are being controlled by this relay circuit. And also the number of appliances can be modify according to the user requirement.

Fig 5. Relay Board

- LCD Display

The Liquid Crystal Display (LCD) is a flat panel or we can also say that it is an electronic visual display. It uses light modulating properties of liquid crystal. We are using 16x2 LCD means there are 16 characters occupy each row and there are such type of two rows. LCD is low cost, easy to program, have no limitation of displaying the special and also the custom characters. LCD’s are available to display the arbitrary images or fixed images. They can display or hidden like the preset words, digits or the seven segments display such as in the digital clock. The LCD has the so many applications like in monitors, TV, instrument panel, air craft-cook-displays and so
on. It is also used in the consumer devices like video player, gaming devices, clock, telephones, calculators and watches.

![Fig 6. LCD Display.](image)

- **AT-Mega 328P-PU**
  The Atmel's AT-Mega 328p is a CMOS 8 bit microcontroller. It is based on the AVR enhanced RISK architecture. It is a 28 pin IC. It has 32 KB flash memory, 20MHz oscillator frequency and 2KB data memory. It is a high performance and low power consuming microcontroller.

![Fig 7. AT-Mega 328P-PU](image)

- **Power Supply**
  Every electronic circuit works on the low DC voltage. It requires a power supply unit to provide the required voltage. In the Home Automation system, the power supply used for relay circuit is 5V, and the bed elevation actuating is used to eliminate ripples from output voltage motor jack needs 12V 5A power supply. Arduino board itself fulfills the 5V requirement and we need an additional 12V 5A supply circuit. A 15-0-15 V centre tap transformer is used here. For converting AC to DC the Bridge rectifier circuit is used after the transformer. After that capacitor C1=3300µF and capacitor C2=0.33µF are used to get ripple free DC output. To get a regulated voltage of 12V and constant current of 5A LM338K voltage regulator is used. Again the capacitor C3=100µF and then the diode D3 is operated when capacitor C3 discharges.

5. EXPERIMENTAL SETUP
The experimental setup of the System is as shown below:

![Fig 8. Experimental setup of the system](image)

6. RESULT
This Home Automation System can controls number of our Home Appliances as per the users requirement. And this particular system is controlling 4 numbers of home appliances. In this system by using Android Phone Application we are sending the text messages towards the controlling unit i.e. Arduino Uno. The format of the text message is to switch on/off the required home appliances. All the components used in this system are very very sensitive and most flexible to use for the user. And finally the Home Appliances are getting switch on/off accurately by using this Home Automation system.

7. CONCLUSION
This paper gives the solution for the need of automation at every basic level that is in our homes. With the help of this paper we come to know that every home appliances which is may be at any corner of our home is in our control. We can control the required number of home appliances by using this system. The system seems much simpler with the use of the text conversion application. Thus this paper gives the most effective and reliable way of home automation system using Android phone Application.
8. FUTURE SCOPE
In future we can make the Home Automation System by using voice controlling technique. Also we can add more number of Home Appliances to this system by using high memory microcontroller as per the user requirement. Also we may add home security technique along with the home automation technique using different security providing technologies. The Burglar alarm system or the fire alarm techniques should be added to the system to make it more accurate system.

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