

ABSTRACT

This project presents the overall design of Home Automation System (HAS) with low cost and wireless system. This system is designed to assist and provide support in order to fulfill the needs of elderly and disabled in home. Also, the smart home concept in the system improves the standard living at home. . The switch mode and voice mode are used to control the home appliances. The main control system implements wireless technology to provide remote access from smart phone. The design remains the existing electrical switches and provides more safety control on the switches with low voltage activating method. The switches status is synchronized in all the control system whereby every user interface indicates the real time existing switches status. The system intended to control electrical appliances and devices in house with relatively low cost design, user-friendly interface and ease of installation.

1. Introduction

Now a day's technology has become even more advanced, challenges in the design of Home Automation Systems are increasing apparently. Seamless control on home appliances by the end user have yet to be entered in the mainstream. This could be a challenging task to create a fully independent and flexible Home Automation System that can support all kinds of devices and technologies related to different functionalities. This report describes how to monitor and control home appliances using the android smart phone app which can works over the Bluetooth network. Though there are many different type of home automation system present in the market however they all have some limitation in their design and operate only under certain condition. Therefore, there is need to develop a home automation system which can control and monitor the home appliances efficiently. This system will prove helpful to the physically challenged people. The main objective of this report is to propose a virtual yet practically useable android based home automation system. The android app is used to send the commands to the microcontroller like Arduino to control and monitor the home appliances. The main feature of this proposed system is to integrate sensors sensed data along with the user commands to control the appliances. The data collected by the sensors will be processed by the microcontroller and based on that further action will be taken regarding the home appliances. The sensors can be used to control the intensity of the light and fan

accordingly to the surrounding environment in which the system is placed. The system will help the user in conserving energy by automatically switching of the lights and fans when there is no need of them i.e. if enough daylight is present in the room the system will turn off the lights automatically. Similarly, if the room temperature drops down the user specified comfortable temperature the system will reduce the speed of the fan or turn the fan off.

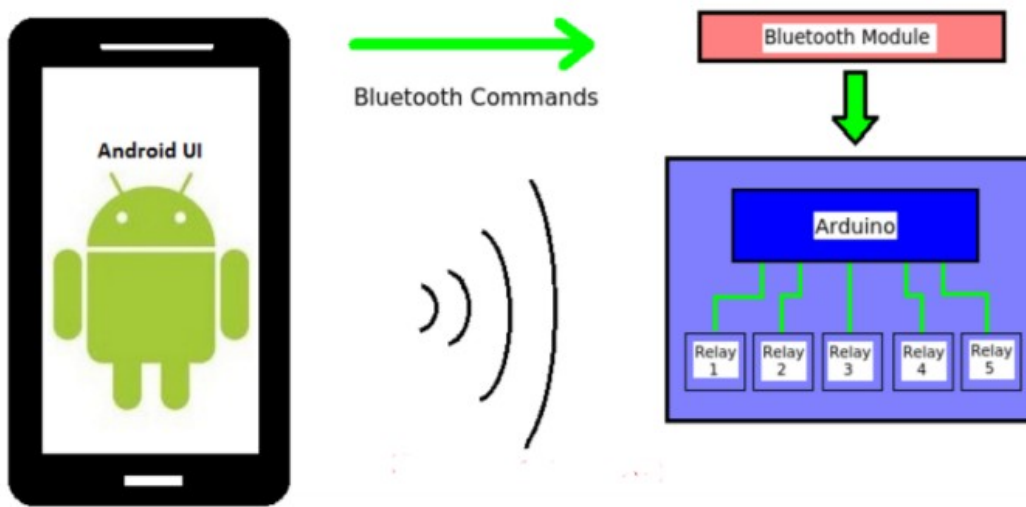
2. Design and Implementation Details

The android application “alpha-omega” controls the various devices that connected to Arduino. In the app interface we have designed buttons to control corresponding devices which when pressed, necessary Bluetooth signals are sent from the android smartphone to the Bluetooth module which is connected to the Arduino. The Arduino checks which signal was sent and compares it to the predefined signals allocated for each appliance.

When the user sends the command through the android app, the Arduino turns ON the corresponding devices by making Voltage High on corresponding pin. This system can be connected to normal switch board found in our house by using relays. Bluetooth Module send Bluetooth signal to the Arduino, where these commands are compared with the predefined values using “if” statement. If there is a match with the value, the system will activate the relay. The DigitalWrite “PIN HIGH” command is used to pass 5 Volts to the Arduino digital pin.

The system has voice recognition method with which all the lights and fans can be

turned on and off individually as well as all together. The system also includes various



sensors such as LDR and LM35 for sensing the temperature and light of the surrounding environment. These sensors will assist the user in controlling the devices effectively and also help them in reducing the overall energy consumption by these devices. The system will decide when to switch on or off the lights and fans based on the sensed physical parameter of surrounding environment. For example, if the LDR senses that sufficient daylight is present in the room the system will automatically switch off the lights except that the user has already put a command of on and off for any light or fan. Similarly, if the room temperature drops down below the user specified comfortable temperature value like 28-50 °C than the system will automatically switches off the air conditioners or the fans. Also if the temperature rises above 50 °C the gas level is between 60 to 90 and flame sensor if high then using GSM module alert SMS is sent to the registered number that there is fire in that particular room. It also includes Ultrasonic sensor which is used to automatically switch on the light of bathroom when a person wants to use it.

3 Module Description

The code is written in accordance with any voice app that connects to Arduino via Bluetooth in PlayStore.

Arduino

Arduino is a programmable micro-controller which can send and receive data over Bluetooth module HC-06 and based on the received signal it will control the corresponding device.

Input/Output:

Arduino uses serial library to read the received bytes from the Bluetooth module using `Serial.read()` function and outputs a digital “HIGH” signal on the corresponding pins

Module 3: Sensors

We are using 2 sensors LM-35 and LDR

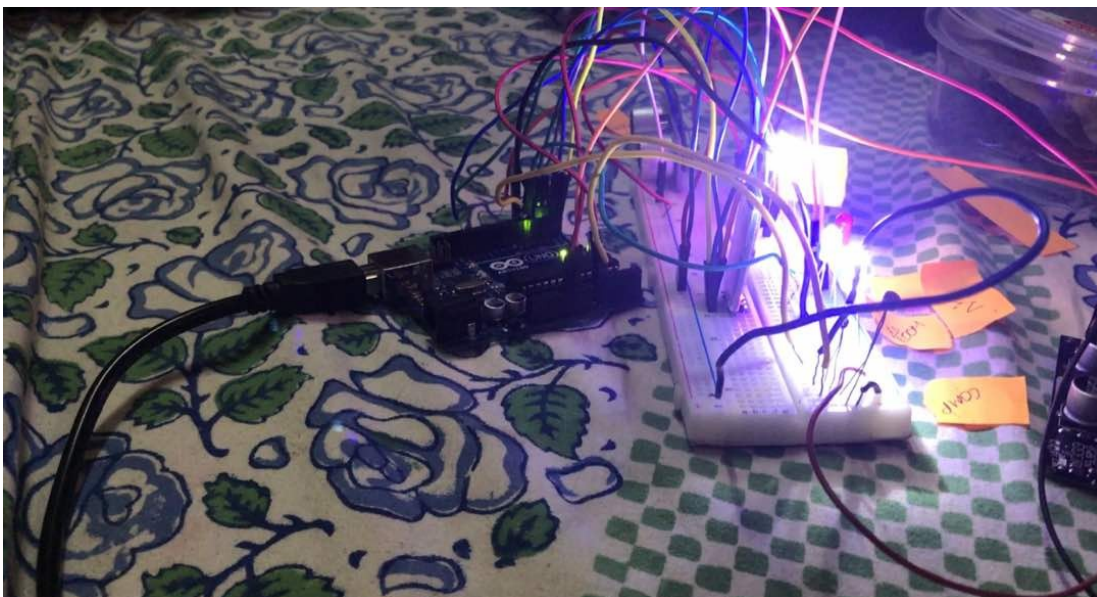
- a) LM-35: Under default condition LM-35 will remain activated and maintain the optimal temperature of the home.
- b) LDR: Under default condition LDR will remain activated and maintain the optimal light of the home. However, whenever the app is launched the control is transferred from auto mode to manual mode.
- c) Ultrasonic : It used to calculate the distance of the ostacle and accordinly lights are switch on or switch off

Input/Output:

The sensors will sense the physical parameter of the surrounding environment and this will serve as input for the module and the output will be the respective analog voltage the Arduino.

3. Hardware Design or Circuit Diagram

CIRCUIT DIAGRAM:



4. Hardware and Software Specification

HARDWARE SPECIFICATION:

COMPONENT	MODEL NUMBER	PRICE (INR)	SPECIFICATIONS	Buy Here
LM35	N/A	149	1) Calibrated Directly in Celsius (Centigrade) 2) Operates from 4 V to 30 V 3) Suitable for Remote Applications ,Low- Cost Due to Wafer-Level Trimming 4) Measures temperature of the surrounding	1

Arduino UNO	R3	499	<p>1) The Arduino Uno is a microcontroller board based on the ATmega328.</p> <p>2) It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz Crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.</p>	
Bluetooth Module HC-06	DX49685	150	<p>1) Voltage: 6V~4.5V</p> <p>2) The Default Baud Rate: 9600 (can be modified)</p> <p>3) Support Android mobile phone Bluetooth</p>	1
Miscellaneous	N/A	Not Definite	<p>1) Connecting Jumper Wires</p> <p>2) Laptop</p> <p>3) 1 Android</p>	--

			Smart Phone	
Ultrasonic		249	1)Detecting range: 3cm-4m 2)Best in 30 degree angle 3)Electronic brick 4)compatible interface 5VDC power supply 5)Breadboard friendly 6)Dual transducer 7)Arduino library ready	1
LDR		103	variable resistor whose value decreases with increasing incident light intensity	1

5. Conclusions

The designed proposed in this paper is novel and it has achieved the aim to provide a cost effective, secure and completely automated system The system is able to control the home appliances remotely from within the house using Bluetooth technology. Hence we can conclude that the architecture and the design discussed in this project along with the prototype of the system displays the basic concept of home automation system by controlling and monitoring the home appliances with voice recognition and mobile app

using arduino. The fact that the system can be connected to the normal switch board present in our homes makes our system flexible and scalable.

6. Future Scope

This system can be further developed by integrating it with the internet using the Wi-Fi module which will help the user to control and monitor the appliances remotely from anywhere in the world.

Along with the light and temperature sensors, a video camera with a motion detector sensor can also be included in the system this will allow the user to keep an eye on his home while sitting far away from the house. This will improve the security level.

Infrared technology can also be used in this system to perform complicated tasks such as changing the temperature of Air Conditioner or changing the channels of television.

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