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Android Based Home Automation Using Bluetooth

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ABSTRACT: Automation of the surrounding environment of a modern human being allows increasing his work efficiency and comfort. In the present times, we can find most of the people clinging to their mobile phones and smart devices throughout the day. Hence with the help of his companion a mobile phone, some daily household tasks can be accomplished by personifying the use of the mobile phone. Home Automation System (HAS) has been designed for mobile phones having Android platform to automate an 8 bit Bluetooth interfaced microcontroller which controls a number of home appliances like lights, fans, bulbs and many more using on/off relay. This paper presents the automated approach of controlling the devices in a household that could ease the tasks of using the traditional method of the switch. The most famous and efficient technology for short range wireless communication- Bluetooth is used here to automate the system. The HAS system for Android users is a step towards the ease of the tasks by controlling one to twenty four different appliances in any home environment.

KEYWORDS: Automation, home appliances, mobile phone, android, Bluetooth, wireless

I.INTRODUCTION

Utilizing the opportunity of automating tasks for a smart home, mobile phone commonly found in normal household can be joined in a temporary network inside a home with the electronic equipments. Android, by Google Inc. provides the platform for the development of the mobile applications for the Android devices. Home automation system is a mobile application developed using Android targeting its vast market which will be beneficial for the masses. Bluetooth is a short-range wireless communication technology that comes in handy as the solution while communicating over an ad hoc network environment like the home environment for connecting the home appliances with the mobile phones. Bluetooth works over 2.4 GHz frequency range up to the range of 100 m with 1 Mbps speed, providing a safe and efficient solution for controlling home automation.

Android is the customizable, easy-to-use operating system that powers more than a billion devices across the globe from phones and tablets to watches, TV, cars and more to come. Furthermore, it utilizes a custom virtual machine that was designed to optimize memory and hardware resources in a mobile environment. Android is open source; it can be liberally extended to incorporate new cutting edge technologies as they emerge. Android breaks down the barriers to building new and innovative applications. Android provides access to a wide range of useful libraries and tools that can be used to build rich applications. Google's argument is that Android is open because the code is opened to all, because Google doesn't charge for the platform, and because developers have access to it all. The only restriction is on Google services, for which the company demands that phone makers conform to certain specifications. Google's take on Android is that they make it as open as possible.

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II.SYSTEM BLOCK DIAGRAM

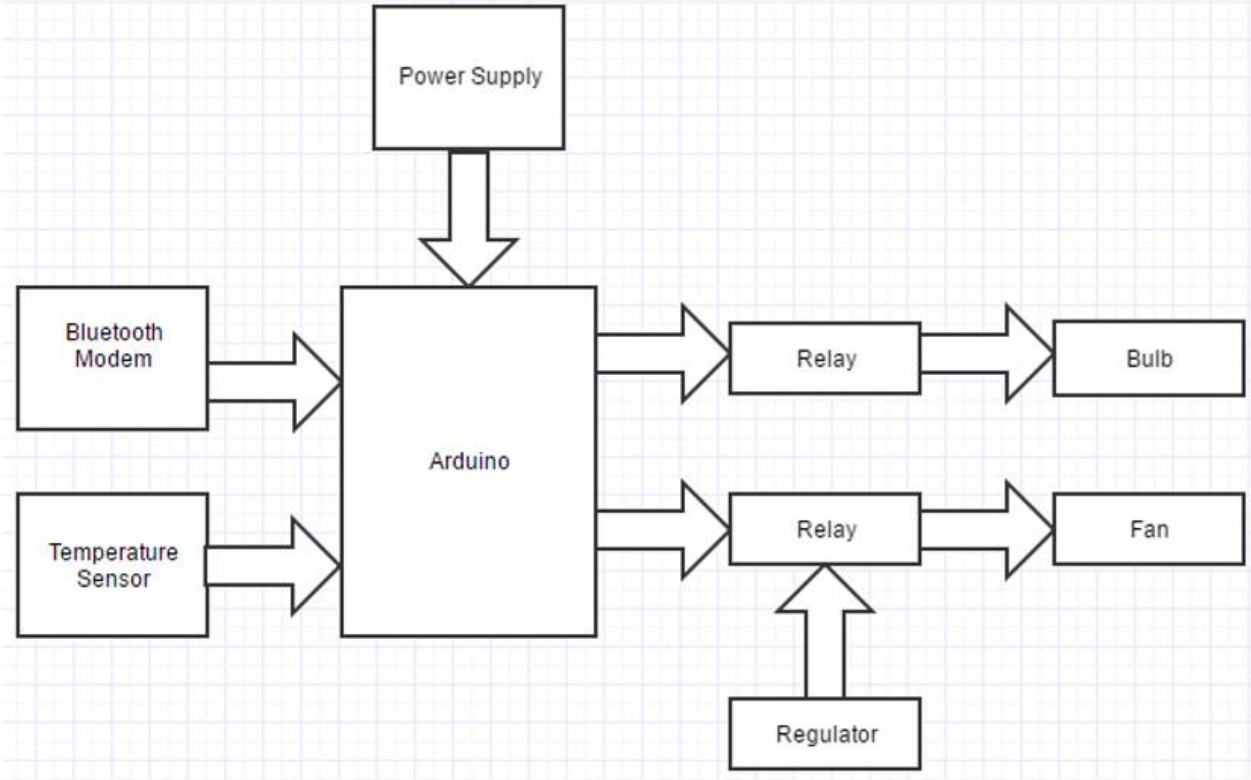

Fig. 1 Block diagram of the system

The block diagram in figure 1, shows all the major components that is required for the system. The controlling device for the whole system is a microcontroller. Bluetooth module is interfaced to the microcontroller. The data received by the module from the phone is fed as input to the controller. The controller acts accordingly on the relays to switch connected electrical appliances. In achieving the task the microcontroller is loaded with embedded C language. For controlling devices of home or office, firstly Bluetooth connection of mobile and Arduino board will be done. The devices will be connected to Arduino BT board using relays or simply resistors. The person who wants to switch ON/OFF particular device will send the signal from Mobile to Controller through Bluetooth. Then as per requirement the controller will operate devices. The sensors that connected to the main control board measure room temperature and humidity level in the house. The indication from the sensor is able to remind the user to switch on/o fan in the house.

III. HOST MODULE

The operating device or the controller we are using is a Samsung Galaxy Y S5360. It operates on Gingerbread OS (API level 8) with 835MHz single-core processor. The executable application is installed on the device with communicates with the server (PC), which in turn send communicates with the client modules or the house appliances through a relay board designed for parallel interfacing.

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IV. RELAY INTERFACE CIRCUIT

The relay interface circuit is used to connect the PC with the household electronic or electrical appliances. The circuit comprises of a relay (5v, 5A), a freewheeling diode, a transistor to drive the relay energizing input and connectors to interface parallel port. For testing purpose we are using two fans and two 100 W bulbs (serving as light bulbs).

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low−power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers they repeated the signal coming in from one circuit and retransmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

V. ARDUINO INTERFACE

Arduino is an open-source computer hardware and software company, project and user community that designs and manufactures microcontroller−based kits for building digital devices and interactive objects that can sense and control the physical world. In this project the microcontroller used for programming is the arduino compiler whose coding is one in embedded C programming language. The high-performance Atmel 8−bit AVR RISC−based microcontroller combines 32KB ISP flash memory with readwhile−write capabilities, 1KB EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte−oriented 2−wire serial interface, SPI serial port, 6− channel 10−bit A/D converter (8−channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8−5.5 volts.

VI.MODES OF OPERATION

The working of the Android Operated Smart Home is categorized into two modes of operation:

1. Automatic
2. Manual

In automatic mode, the speed of fan is adjusted according to the measured value of temperature. Bulb is turned ON or OFF according to intensity of light available in the room. Normally, before commencing communication, devices can use two methods for initiating communication with each other which can be done normally either by discovering other nearby devices to detect the address and services that are provided by other devices or by knowing the device address beforehand and directly using that address for further communication process. In Home Appliance Control, the later method is used.

In manual mode, speed can be adjusted using the android application in the android phone. Conventional way means traditionally all the devices are controlled using the android app through bluetooth module. Any user wants to make device ON/OFF without using HAS then he/she can use particular switch attached to device.

VII. APPLICATION FLOW CHART

The application flow chart in figure 2 shows the program flow. The Bluetooth module and connected relays are initialised first. The modem will now check for any data. If any data is received, it will identify the device and the mode in which it is to be controlled. If the received data suggests to controlling the fan in automatic mode, the modem will send data to the temperature sensors via controller. The controller is programmed to execute a particular action for a particular value of received data.

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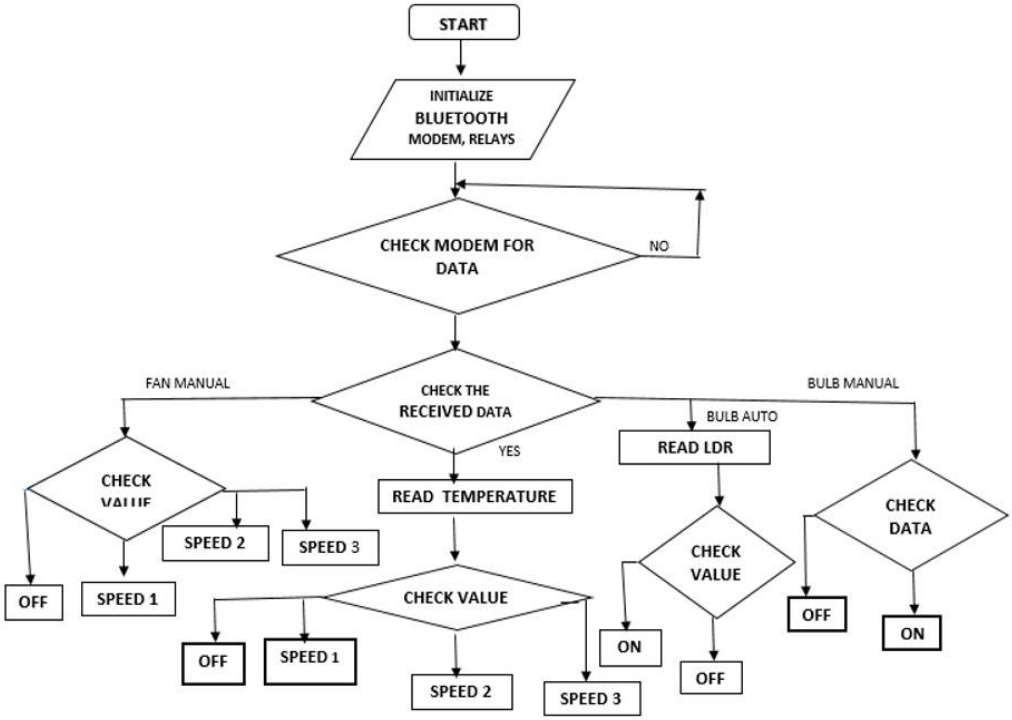

Fig. 2 Application flow chart

VII. RESULT AND DISCUSSION

Finalised hardware is shown in figure 3. The android operated smart home was designed and implemented. Simulation in Proteus showed expected results. The proposed design used a smartphone app to control the electrical equipments. The system reduces the human labour required for switching on and off the electrical equipments.

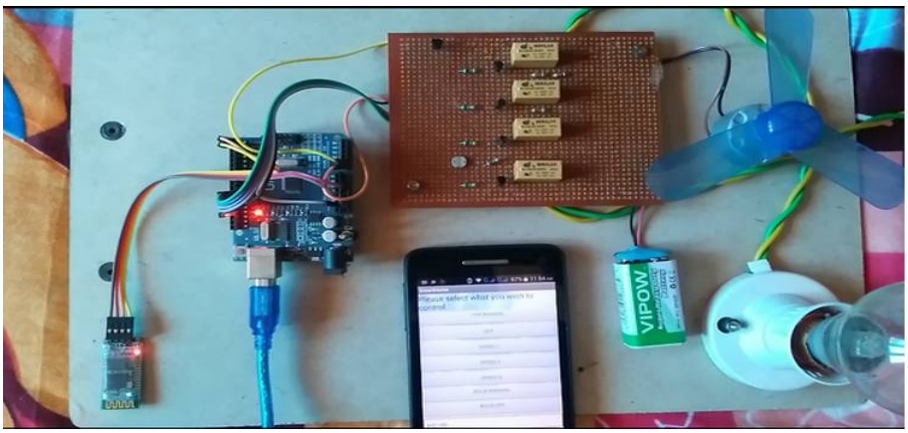

Fig. 3 Experimental Setup

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IX. CONCLUSION

The home automation system has been experimentally proven to work satisfactorily by connecting sample appliances to it and the appliances were successfully controlled from a wireless mobile device. The Bluetooth client was successfully tested on a multitude of different mobile phones from different manufacturers, thus proving its portability and wide compatibility. Furthermore, flexible types of connections are designed as backup connections to the system. The connected GUIs are synchronized to the control board. They indicate the real−time switches status. The system is designed in user-friendly interface. The easy to use interface on Window and Android GUI provides simple control by the elderly and disabled people.

For future work, the Window GUI will be implemented with speech recognition voice control. The android GUI will be implemented as a remote Bluetooth microphone to the Window GUI. All the voice signal inputs to the smart phone will be transmitted to the Window GUI for signal processing. Also, the push buttons implemented in low voltage activating switches will be replaced by capacitive sensing switches. All the future work is expected without spend extra cost, even one cent from the current system.

REFERENCES

[1] R. Piyare, Bluetooth Based Home Automation System using Cell Phone, Consumer Electronics 6, pp. 192-195, 2011.
[2] Kailash Pati Dutta, Microcontroller Based Voice Activated Wireless Automation System,VSRD-IJEECE Vol. 2(8),2012,642649
[3] Baris Yuksekkay, A GSM, Internet and Speech Controlled Wireless Internet Home Automation System,IEEE Transactions on Consumer Electronics Vol. 52, No. 3, AUGUST 2006.
[4] N. Sriskanthan, Bluetooth Based Home Automation Systems, Journal of Microprocessors and Microsystems 2002, Vol.26, pp. 281-289.
[5] N. Kwang Yeol Lee, Remote-Controlled Home Automation System via Bluetooth Home Network, SICE Annual Conference in Fukui 2003, Vol.3, pp. 28242829.
[6] K James, Design and Implementation of a Bluetooth based General Purpose Controlling Module, IEEE, 2008, pp. 206-211.