Home Automation System Using Android and WiFi

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Abstract: *Today's world has seen rapid and lucent spread of Android Devices. Any system, thus, developed which has support of the ubiquitous Android –enabled devices will be much appreciated. Our project is based on this idea along with the much-needed Automation System interfaced with the Android Systems. We have harnessed the easy-to-understand Android GUI to a constructive work whereby we see to it that the home is automated and energy is saved. This makes our home intelligent enough to save electricity, which is the need of the hour. We have elucidated this idea into realization with the help of Wi-Fi technology, which really offers easy and really much awaited Home Automation Systems (HASs). This system has an upper hand from other similar developments made with the technologies such as Bluetooth since it works on Wi-Fi. Thus we have offered a scalable and cost-effective Home Automation Systems (HASs).*

Keywords: AndroidApplication, Wi-Fi, Automation, Home, GUI, HASs and AVR.

1. Introduction

Home automation can be defined as a system implemented at a residential place whereby the intention is to make the place intelligent so that energy is conserved and security is maintained. It makes the life of the residents flexible, healthy and comfortable. Initially systems were developed in this regard but those systems had to be deployed on Internet and heavy machineries like a big Personal Computer. Our system will be free from all this giant components, which, indirectly suggests that our system has a good quality of portability. Most systems would exchange data or would communicate with the help of Bluetooth, ZigBee and GSM. These systems have their own disadvantages. For example, system-implementing ZigBee has too low bandwidth for the data communication whereas the GSM implementing system has too large bandwidth for the data communication. Thus, there is wastage of the essential bandwidth, which goes without being used. The other systems, which were in use, are, for example Java Based Systems and SMS based systems. Java Based Systems still use web pages, which is a disadvantage if data intranet or Internet is off. SMS based system is more costly since it requires data transfer from the real time service provider. This Wi-Fi protocol has some upper hand benefits like its range is in the radius of 150-200m .The mobile application can also extend the security of the system via an implementation of the password protected application. **The hardware of the system is an AVR, which is ATMega16 microcontroller to provide a link between the switches and the Android device. The above said System has pros and cons.**

It is a system, which implements on Android System, which is very much ubiquitous and profoundly available. It has some disadvantages, which will be listed, in some upcoming section.

2. Related Work And Literature Review

R.A Ramlee, M.A. Othman, M.H. Leoung, M.M. Ismail, S.S.S. Ranjit [1] has implemented the HAS using Wireless Bluetooth Technology. The work from the paper has extended the system by keeping the physical switches where the 5V switches replaced the conventional switches, which guarantees that electric shocks don't take place. This is to ensure that safety must be of the prime concern at home. The system is implemented with the help of Bluetooth module, which is of the measure of frequency 2400 Hz and is able to provide connectivity up to 100 meters at the speed of 3 MBPS. Moreover, a group of devices not exceeding than 7 can be interfaced in a Picante.

Deepali Javale, Mohammad Mohsin, Shreerang Nandanwar and Mayur Shingate [3] has designed a standalone embedded system board Android ADK (Accessory Development Kit) at home. Home appliances, which are to be automated, are interfaced to the ADK and then data is communicated between Android device and ADK. Appliances are connected to the I/O ports of the embedded System and the status is passed to the ADK. The embedded System used here is Arduino Embedded System.

Shaiju Paul, Ashlin Antony, Aswathi B [4] implements this project via Android devices using Wi-Fi as communication protocol and a Raspberry Pi as Server system. The above said server is connected with a relay circuit, which controls the devices at home. Raspberry Pi board is considered to be the mini-processor which ensures that it has a setting up of and selecting raspbian OS from noobs package.

3. Existing System

The existing system [1] has implemented HAS by making the use of a Microcontroller called PIC18F2550 used for serial & USB features. The sensor used is HSM-20G for humidity and temperature sense. The communication with the appliances is done through Bluetooth module called Cytron BlueBee Bluetooth. There are 2 types of connections used viz primary and secondary connections. After the smartphone's BT connection is connected to personal computer the window GUI will act as a server to forward any data from/to the smart phone and main control. The disadvantages are more as compared to the advantages. For instance, the effective area under control from a Bluetooth module is 100 meters in diameter. The primary and secondary connections which were supposed to be the backbone and the saving – face of the system intruded it physically. Moreover, the limitations of 7 devices in a "Piconet" is far less than what is to be implemented practically.

4. Proposed System

In this paper, we propose a system, which is very different than the existing system. We are going to implement it with the help of direct Wi-Fi (Wireless Federation), which fits the bill of WLAN 802.11 standard. The main advantage of this system is that it can be implemented with a wider range of not more than 200 meters. It allows communicating with a brief and small setup without zap wired connection. This system can be extended for a proper HVAC (Heating, Ventilation and Air Conditioning) system.

5. Hardware And Software Specifications

a) *Host Module/Controller*

The operating device or the controller we are using is a Samsung Galax 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.

b) *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 LED's (serving as light bulbs).

c) *Android*

For this system we are using Android platform since it has a huge market and open source.
A number of different programming tools were used for the development of the application.

✓ *Eclipse Indigo IDK*

The main application for Android Smart Phone is coded in the environment of Eclipse Indigo IDE and compiled as a standard android executable that runs on platforms above API level 8 (Gingerbread or higher).

✓ *Android SDK*

The development kit used to program on Eclipse Indigo IDE is the ANDROID SDK developed by *Google, Inc.*

d) *Wi-Fi*

The communication link needs more security. The Wi-Fi protocols provide more security for secure connection. An Android application has two methods to create a link. The first one is using IP address of the Wi-Fi module directly coded into the app for initial testing. The second one is, it allow users to search for the device, which becomes a final decision. Then user can select the device from a list, for making connection. The basic steps for connecting to wife module were the same for both versions of the application. Once got ip address of the destination then user can create socket with Wi-Fi module.
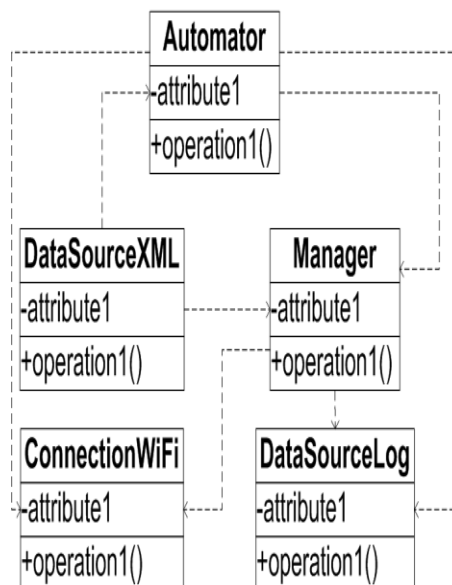
6. Design And System Architecture

- *Class Diagram:*

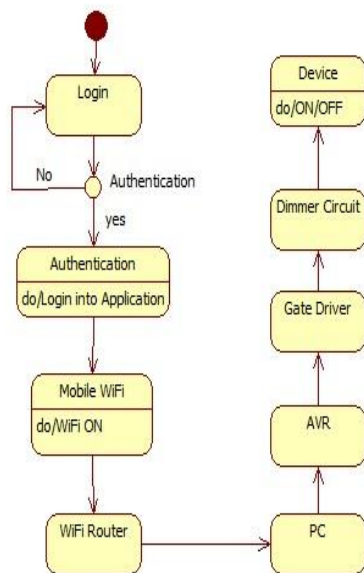**Fig. 1: Class Diagram of System**

- *Activity Diagram:*

Fig. 2: **Activity Diagram of System**

Fig. 2 shows that our system is basically have a security system, which gives access to the system through password authentication. Then Wi-Fi is switched on with the Wi-Fi router, which is accessed by the AVR called ATMega16.The dimmer circuits are used to control the speed of the appliances like fan. With the dimmer circuit a device can be switched on and off also.
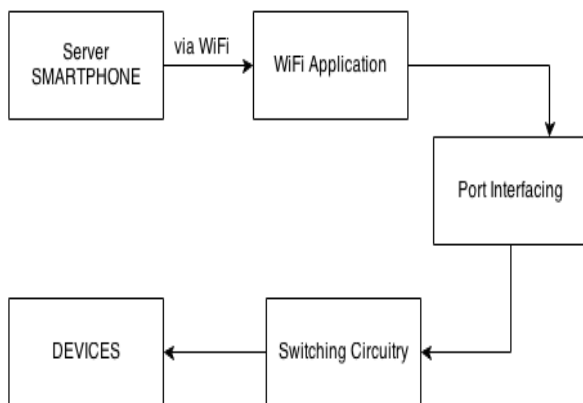
- *System Architecture:*

Fig. 3: **System Architecture**

Fig.3 shows that in our system the phone acts as a server or the controlling device application. Thus it acts as a central control, which acts as a user interface device where the user controls the application through a touch screen on the phone. The control is communicated to the lab view application through Wi-Fi. The component, which is interfaced with the lab view application, is the port's interfaced which is directly interpreted with the switching circuitry. The switching circuitry is in hold of the devices to be automated.

7. Conclusion

The goal of the paper was to design a system, which should be easy to implement, and short ranged. The project is implemented through onboard Wi-Fi, which is inbuilt in the mobile phones having an Android as its system. Implementing the actuators for door systems for more security aspects can increase the future scope of this project.

8. References

[1] Smart Home System Using Android Application-R.A.Ramlee, M.A.Othman, M.H. Leong1, M.M.Ismail, S.S.S.Ranjit
[2] Android Based Security And Remote Surveillance System-Menthol Kumar
[3] Home Automation and Security System Using Android ADK-Deepali Javale.
[4] Android Based Home Automation Using Raspberry Pi-Shaiju Paul
[5] Smart Home Automated Control System Using Android Application and Microcontroller-Mohammad Abd Al Latif Mowad