

Home Automation System Using Android and Wifi

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Abstract—Today's world has seen rapid and more spread of Android Devices. Any system thus developed which has support the ubiquitous android enable devices will be much appreciated. Our project is based on the idea along with the much-needed Automation System interfaced with the Android Systems.

We have easy-to-understand Android GUI to a constructive work whereby we see to it that the home is automated and energy is saved. This system makes our home intelligent enough to save electricity which is the need of the hour. We have elucidate 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 upper hand from other similar developments made with the technologies such as Bluetooth since it works on Wi-Fi. Thus we offered scalable and cost-effective Home Automation Systems.

Index Terms- ARM Controller, GUI for Android application, WIFI Router, Relay.

I. 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 will make the life of the residents flexible, healthy and comfortable. Initially systems were developed in this regard but those systems have 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 of the systems would exchange data or would communicate with the help of Bluetooth, ZigBee and GSM.

In order to achieve by any smart phone with Android OS upon GUI based touch screen operation. In order to achieve this Android application act as transmitter which sends ON/OFF commands to the receiver where loads are connected. Also by turn ON WIFI of android home applications are to be ON/OFF.

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 ARM, which is LPC2148 microcontroller to provide a link between the relays and the Android device. It is a system, which implements on Android System, which is very much ubiquitous and profoundly available.

In nowadays, we must make use of various high-tech tools and equipments to get our jobs done and make our life comfortable. And the mobile phone is the in-separable part of human lives today. With the help of mobile phones human can do many works related to their civil life. At today's repaired technology the mobile phone is also become smart one. With the help of this smart gadget we can make our home smart one.

II. LITERATURE SURVEY

Main elements of smart home:

1. Internal network – wire, cable, wireless.
2. Intelligent control – gateway to manage the systems.
3. Home automation – products within the homes and links to services and systems outside the home.

The range of different smart home technologies available is expanding rapidly along with developments in computer controls and sensors [1]. Smart homes present exciting opportunities to change the way we live and work, and to reduce energy consumption at the same time. There are already various implementations of smart homes. Most of the implementations use wireless technologies for communication between home appliances and main unit. The main problem that people are trying to solve in smart home is how to make a home that will help people to automate regular daily activities. For example, like adjusting home temperature, ensuring that home has enough daily light and make home secure. Lead with this idea, people developed smart homes based on different technologies [4]:

- 1) Smart home based on custom microcontroller and mobile application. Smart home system is using Bluetooth for communication between mobile application and system. It depends on the controller that it is using. Some microcontrollers are used more than others, which makes those smart home systems more flexible.
- 2) Smart home based on a custom microcontroller and computer. Smart home system is using Bluetooth for communication between appliances. It is based on a computer as entry point for communication between user and smart home system. Computer is connected using wire to the microcontroller.
- 3) Smart home based on ARM and mobile application. Smart home system is using Bluetooth for communication between mobile application and ARM. This system is flexible and scalable. Limitation of this system is Bluetooth range.
- 4) Smart home based on a computer. Smart home system is using Wi-Fi for communication between appliances and main computer. Main computer is communicating with appliances through microcontroller. Main advantage of this

System is that unlimited number of appliances can be connected to it

III. BLOCK DIAGRAM

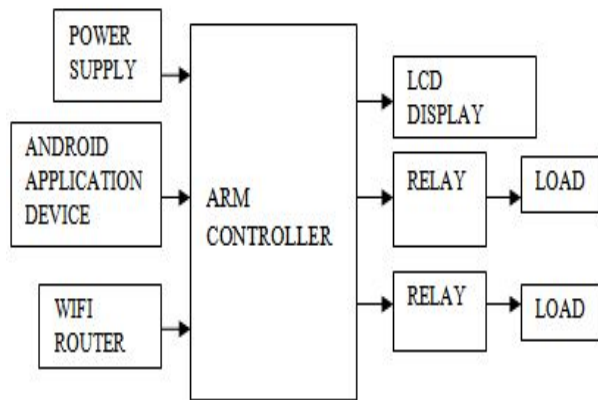


Fig.1 Block Diagram of Home Automation system

IV. BLOCK DESCRIPTION FOR HOME AUTOMATION SYSTEM

A. Relay Interface Circuit

The relay interface circuit is used to connect the PC with the house hold 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 or loads).

B. 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 IDE

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.

C. 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.

D. ARM CONTROLLER

The LPC2148 ARM controller is used here. This is based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontroller it embedded high speed flash memory ranging from 32 kB to 512 kB.

A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb ode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, LPC2141/42/44/46/48 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale.

16-bit/32-bit ARM7 TDMI-S microcontroller in a tiny LQFP64 package.

F. KEY FEATURE

8 kB to 40 kB of on-chip static RAM and 32 kB to 512 kB of on-chip flash memory. 128-bit wide interface/accelerator enables high-speed 60 MHz operation.

In-System Programming In-Application Programming (ISP/IAP) via on-chip boot loader Software. Single flash sector or full chip erase in 400 ms and programming of 256 bytes in 1 ms.

Embedded ICE RT and Embedded Trace interfaces offer real-time debugging with the on-chip Real Monitor software and high-speed tracing of instruction execution.

USB 2.0 Full-speed compliant device controller with 2 kB of end point RAM. In addition, the LPC2146/48 provides 8 kB of on-chip RAM accessible to USB by DMA.

One or two (LPC2141/42 vs. LPC2144/46/48) 10-bit ADCs provide a total of 6/14 analog inputs, with conversion times as low as 2.44 as per channel.

Single 10-bit DAC provides variable analog output (LPC2142/44/46/48 only).

Low power Real-Time Clock (RTC) with independent power and 32 kHz clock input.

V. PROPOSED WORK

Intelligent information appliance is the main direction of development in the appliance control field. Intelligent appliance network has small amount and low speed of data transmission; there are many appliances in family and it needs more networks in family and it needs more capacity.

VI. CONCLUSION

The security of the system is ensured by user authentication and encryption. The hardware interface module is implemented on an ARM controller. The Android based smart home app communicates with the web-server via internet. The smart home app can be installed in any android

devices, and control and monitor the smart home environment. The android application consists of a user friendly GUI which makes it convenient to use for anyone. Addition or removal of new devices made easier with the help of a web interface. Presently the system is implemented with a single hardware interface module but the server is designed such that it can be handle more number of modules.

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