Home Appliances Control Based On Android Smartphone

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Abstract—Today we are living in 21st century where automation is playing important role in human life. Home automation allows us to control household appliances like light, door, fan, AC etc. It also provides home security and emergency system to be activated. Home automation not only refers to reduce human efforts but also energy efficiency and time saving. The main objective of home automation and security is to help handicapped and old aged people which will enable them to control home appliances and alert them in critical situations. This paper focuses on the design of Android terminal, the communication between ARM and Wi-Fi/Internet module, the realization of the wireless module device's driver. We would develop an authentication to the system for authorized person to access home appliances. The system has the features of easy installation and low cost, and the hardware and software can be customized and extended. It presents the design and implementation of automation system that can monitor and control home appliances via android phone or tablet. What's more, the users can manipulate appliances anytime, anywhere, letting our houses become more and more automated and intelligent.

Keywords-Android Smartphone, ATmega32, Sensors, PC, Driver IC, MAX232, Wi-Fi Router

I. INTRODUCTION

Smart Phones are becoming more and more popular around the world. Currently, Android has grown to more than 75% of Smart Phones/ Tablets user base. This mass adoption of Smart Phones has fuelled a demand for applications both soft and hard. Today, Smart Phones are more than just Phones, they're now the main Human Interaction Devices and users thus want to control/accomplish most of their tasks from their Smart Phones rather than conventional ways.

II. BLOCK DIAGRAM

The many wireless protocols that come embedded on a Smart Phone has introduced a wireless lifestyle reliving people from the "wired" cable chaos. With the exception of few low cost tablets, WI-FI/Internet can be found in almost all Android based devices which have been very popular over years for wireless data transmission with ease. Home automation systems are one of the major adopters of Bluetooth technology. Here, we propose a home automation system based on Bluetooth technology.
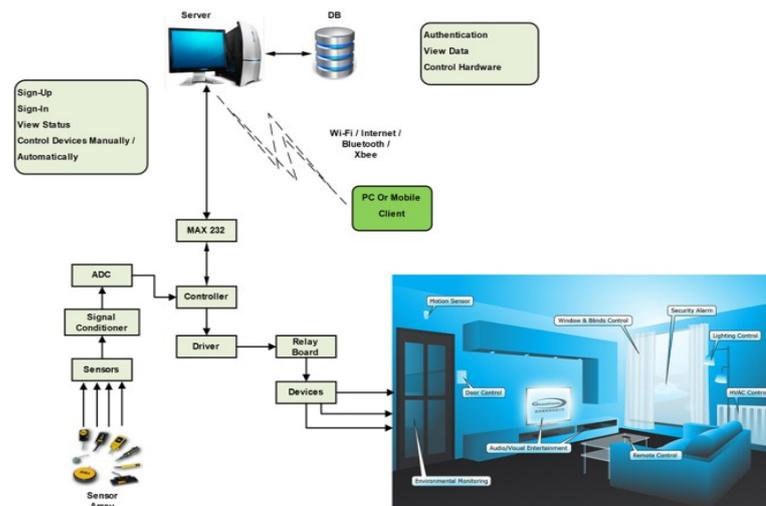
Figure 1. Basic Block Diagram

III. WORKING

This project is depends upon a Home automation system based on Android smart phone. Basically here we are used a wireless network. There is a various types of sensors placed to sense a various parameters like a temperature, pressure ,smoke detection, light ,sound etc. When that sensors sends a signals to a signal conditioning circuit that block conditioning a that signal by filtering noise from that and amplify the signals over there. The signals which is in the form of analog signal ADC converts that signals to a digital formats because controller IC knows the data in form of 0 and 1 i.e. in digital form.

So ADC passes that signals to a controller. Controller accepting that signals and operates the appliances as the commands are given to controller. The next block is driver IC which is a IC controls a devices or drives a devices as controller sends a signals. Here ULN2803 is a driver IC used to operates the appliances. A driver IC connects to a many of relays and that relays having a function to a operates a devices as Fans, Motors, Lights, TV,AC etc.

Controller is having a other connected block of MAX232. The MAX232 IC is used to convert the TTL/CMOS logic levels to RS232 logic levels during serial communication of microcontrollers with PC. The controller operates at TTL logic level (0-5V) whereas the serial communication in PC works on RS232 standards (-25 V to + 25V). This makes it difficult to establish a direct link between them to communicate with each other. So by using this type of converter IC we can communicate with server pc.

Those servers PC having a data base, which contains a stored informational data which will be user ID its password. When an client wants to access a this system those must have to authority that's why for security purpose here we are using a authorized data system by using a data base network. At the of block list there is a presents of a client pc/smart phone who can operates a all this system. This system having a android phone, in which we forms a special type of .apk file software specially for a remote user client. That's why it's easy to operates full system just by using a touch to your phone. Before that here is also a authorized login window to secure used of our system. Figure shows that full construction of project detailed wise. There are sensor inputs at pin no. A. Here we are forming a project for a four sensor device and other are our non-sense able devices like fans, lights, TV etc. Following are the components of circuit diagram.

IV. COMPONENTS

4.1 ATmega32:

Atmega32 is a main controller IC which operates on a 5v power supply. This IC having a four ports.ATmega32 connected to a ULN2803 IC and MAX232.
ATmega32 communicates with PC by using a MAX232.

4.2 ULN2803

ULN2803 is a device driver IC, This IC having a 8 I/O pins. And Operating temperature of this IC is 5v but this IC can operates with a 12v-230v range.

4.3 MAX232

MAX232 is connected to a port D of Controller IC. It is a level converter IC forming a operation of RS232 to TTL. That means from logic0-logic25 we can getting here output at TTL in the form of logic0-logic1.Serial communication is done at this stage.

4.4 Relays

Relays are used here to operate a our devices which are having a high voltage devices .
There are 4 relays we are using here.

4.5 Android smart phone

Android smart phone is also a main part of overall project. We are creating a android application as login window and control interface window for operating our appliances through a wireless communication.
When client log ins that time request goes towards a server side, then server conforms that authority of client then client can control their home appliances by just touching a window, which having a control inter face designed.

4.6 PC link

PC link is a server Pc which stores data base information. There having a wireless module by use of this android phone can communicate or sends a request to a pc. And at the output of pc we can get here response in the form of appliances controlling.

4.7 LDR

As the name suggests, LDR is a type of resistor whose working depends upon only on the light falling on it. The resistor behaves as per amount of light and its output directly varies with it. In general, LDR resistance is minimum (ideally zero) when it receives maximum amount of light and goes to maximum (ideally infinite) when there is no light falling on it.

4.8 Potentiometer

Potentiometer(also known as the linear position sensors, resistors ruler), suitable for injection molding machines, woodworking machinery, printing, spraying, machine tools, robotics, engineering, computer-controlled monitoring of sports equipment and other applications requiring precise measurement of displacement. This kind of sensor is cheap, low-temperature, high-speed low-torque operation and application of the unique characteristics of conductive plastic technology.

V. ANDROID (O.S)

Android Application

To control the relays with the help of microcontroller relay is connected to the 4th port of the PIC Microcontroller. By pressing the button on the GUI of the Android Smartphone we can control the relay.

Android's releases prior to 2.0 (1.0, 1.5, 16) were used exclusively on Android mobile phones. Most Android Smartphone and some Android tablets now use a 2.x release and Android 3.0 was a tablet-oriented release but does not officially run on mobile phones. The current Android version is 4.3. Android's releases are nicknamed after sweets or dessert items like

- Frozen Yogurt ("Froyo") (2.2)
- Ginger Bread (2.3)
- Honeycomb (3.0)
- Ice Cream Sandwich (4.0)
- Jelly Bean (4.1)
- Kit Kat (4.4)
- Lollipop being the recent one.

Android applications are written in the Java language. The Android Software Development Kit (SDK) provides all necessary tools to develop Android applications (API). This includes a compiler, debugger and a device emulator, as well as its own virtual machine (emulator) to run Android programs. The Android SDK provides tools for code compilation and packaging data and resource files into an archive file with .apk" extension called as an Android package. Android devices used the '.apk' file to install the application. Android's application framework allows for the creation of extremely feature rich and novel applications by using a set of reusable components.

The amalgamation of the Android development environment with the wireless technology is known by Android's support for the Wi-Fi network stack. The application framework enables access to the Wi-Fi functionality using the Android Wi-Fi APIs. These APIs allow wireless applications to connect to other Wi-Fi devices for point-to-point and multipoint wireless features.

VI. GUI (GRAPHICAL USER INTERFACE)

(a) Login interface   *(b) Control interface*

Figure 2. User Interface

Graphical user interface is used for security purpose basically it is a authorized part by client or user side. Because of this no can directly interact or will use our home automation system. The design of this window performs on Special IDE software ADK that is android development kit. Later on we can manage control interface by our own view as shown in figure (b) ,We can place logos of appliances or just name of appliances as Light, Fan etc.

VII. FUTURE SCOPE

In future to make a Home more and more automated an intelligent. In industries as well in factories reduce a human work. In hospitals also, for remote used applications. People life becomes more high tech.

VIII. CONCLUSION

Both the client terminal and the processing center are based on Android OS which has lots of advantages, such as humane interface, customizable and extendible applications and so on. Based on the analysis above, Android phones will become the most popular control terminal of the smart home. By constantly improving the control function, it allows us anytime, anywhere to control any device, and finally realizes the highly intelligent home.

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