International Journal of Engineering Research and General Science Volume 3, Issue 3, May-June, 2015
ISSN 2091-2730

# Home Automation using Android App and Cloud Network

Anushri Aware, SonaliVaidya,PriyankaAshture, VarshaGaiwal

PES's Modern College of Engineering, Pune-04

anushriaware@gmail.com, sovaidya@gmail.com,

ashturepriyanka@gmail.com, varshabgaiwal@gmail.com,

Mb No : 9545725051 (Anushri Aware)

**Abstract**— In today's century the automation has made human's life easier. This paper gives idea about automating home system in which we can control and manage devices like lights, fans using android application through internet connection, also by using home automation system we can provide home security provided by the IR sensor as burglary alarm if any intrusion is detected. Home Automation System also provides Video Feedback to the android user for surveillance purpose. It reduces human efforts as well as saves energy and time. The main advantage of this system is that it is very much helpful for handicapped and old people. This system helps handicapped and old people to control devices and alert them in critical situations.

In this paper, we have designed the android app and PC application for controlling home system. All home appliances like lghts and fans with relays are connected to the embedded circuit board which will be connected to the home PC.And through Home PC we are providing the authentication to the system for various mobile users to access home appliances. The Communication between Home System and Android Application will make through Cloud server using internet or wifi.

**Keywords**—Home automation System; Home security; Sensors; Surveillance; Embedded System; Cloud Server; Android Application

## I. INTRODUCTION

### Overview :

The life cycle of modern man is evolved in such a manner that without multitasking he will lag behind the rest of the society by light ages. So to make life of the users more comfortable, easier and faster we shall be developing the HAS system for controlling home appliances.

Home automation refers to the use of computer to control home appliances. Systems can range from simple remote control of lighting through to complex computer/micro-controller based networks with varying degrees of intelligence and automation. Home automation is adopted for reasons of ease, security and energy efficiency.

In modern construction in industrialized nations, most homes have been wired for electrical power, telephones, TV outlets (cable or antenna), and a doorbell. Many household tasks were automated by the development of specialized automated appliances. For instance, automatic washing machines were developed to reduce the manual labor of cleaning clothes, and water heaters reduced the labor necessary for bathing. Home automation can also provide a remote interface to home appliances or the automation system itself, to provide control and monitoring on a Smartphone.

### Brief Description

Home Automation is a term used to describe the working together of all household appliances. For example, a centrally-controlled panel can have the capability to control everything from security systems, video systems, lighting.

A home automation system integrates electrical devices in a house with each other. The techniques employed in home automation include those in building automation as well as the control of domestic activities, such as home entertainment systems, houseplant and yard watering, pet feeding, changing the ambiance "scenes" for different events (such as dinners or parties), and the use of domestic robots. Devices may be connected through ahome network to allow control by a personal computer, and may allow remote access from the internet. Through the integration of information technologies with the home environment, systems and appliances are able to communicate an integrated manner which results in convenience, energy efficiency, and safety benefits.

Home Automation is automating the control of your home so it works for you, adding convenience and making your life easier, even while saving energy! It can be as basic as dimming lights with a remote control or as complex as setting up a network of items in your home (such as a thermostat, security system, lighting and appliances) that can be programmed using a main controller or even with your cell phone from anywhere in the world! It is now possible, using wireless home automation devices with state-of-the-art Z-Wave technology, to control every aspect of your home environment without installing a single wire.

## II. LITERATURE SURVEY

As the price for small electronic devices has dropped significantly, this development towards cheap embedded devices drives forward the idea of ubiquitous computing i.e.computing is made to appear everywhere and anywhere, where humans are surrounded by a multitude of such devices to make their lives easier. Naturally, this also includes the living space of humans, mainly their homes . Thus HA technology has been emerged.

Home automation means controlling various home appliances such as turning lights and fan ON/OFF, Intrusion detection using IR sensors also providing video surveillance etc. The home automation system gives the user complete control over all remotely controllable aspectsof his/her home. The benefits of Home Automation are it is secure, saves money, time, maintenance cost and make life easier and comfortable. In design implementation the hardware components used are Microcontroller 89c51, ADC0808, MAX232, IP Camera, signal conditioning circuit.

### A] EXISTING SYSTEM

The controlling methods of existing system for home automation are:

1. Remote controlling(Bluetooth, radio frequency, infrared)
2. Through mobile (SMS)
3. Through web-browser

### B] ANALYSIS OF EXISTING SYSTEM

Controlling the home appliances through the radio frequency or Bluetooth have some limitations that user can access it from a specific distance. Thus it is not always feasible to control your devices at some particular distance. It should work efficiently in every aspect, while the major problem in this is speed or distance limitations. Problems faced by mobile application via sms is to

send the controlling signals sms uses more time and the cost of sending these signals to devices is more. This will increase the cost of the system.

Now through the web browser , it is not always possible to open a browser for accessing devices each and every time. The time efficiency is thus affected by the use of web browser. Every time to check the device status or to send a signal we have to open it and if there are any changes in setting the threshholds of the devices it is more time and cost consuming. Thus we are using more efficient way to overcome this problems faced by the existing technologies.

C] PROPOSED SYSTEM

Proposed system makes the use of Internet or Wifi which is more modern technology. Since , people are using more and more upcoming technologies and modern equipments, we are developing an android app. The use of smart phones is becoming more popular and is being widely used , so the home automation system becomes more flexible. The features of the system are :

1. To develop HAS that gives the user **complete control** over all remotely controllable aspects of his or her home.
2. Reduces human-efforts but also provides energy efficiency and time saving.
3. Communication between the embedded system and the android app through WIFI or **internet**.
4. Make smart phone flexible to control household or buisness appliances.

## III. SYSTEM ARCHITECTURE

- The home automation system has three main modules ,those are: Cloud server, Android and Home System.
- Home appliances are connected to the Home system through Microcontroller board. In which home system fetches sensors data from microcontroller board and upload it to the cloud server and information is given to the android users through internet to perform respective task.

The figure below depicts the overview of the Home Automation System Architechture.

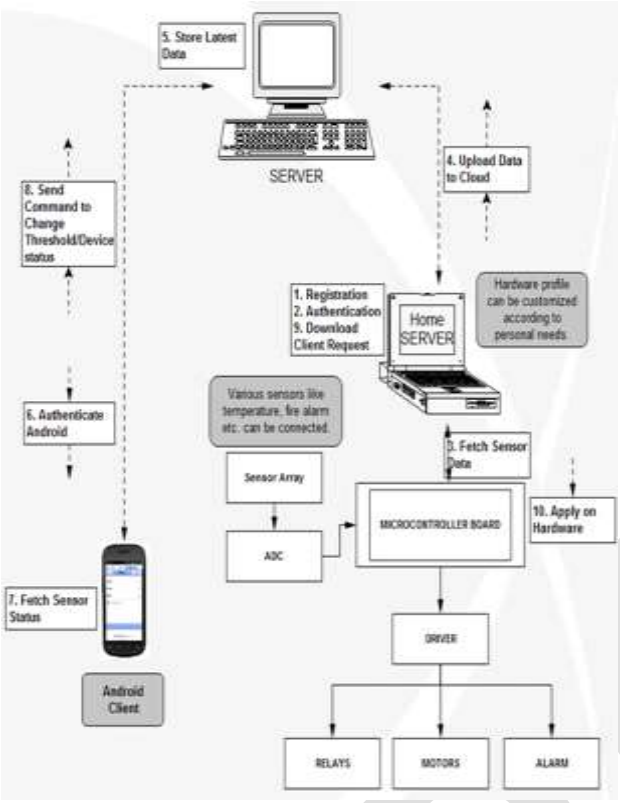


Fig 1: Architecture of Home Automation System

Home automation system is of type software as a service.

The home automation system uses the following terms for storing the data and for building the cloud server :

- Mysql database
- Server: Glassfish server
- Java swing

## IV. TECHNOLOGIES USED

A] Cloud server :

The central server is focused in providing services to the other three modules. Central server acts as data repository of the system. It provides two interfaces to the two sub modules; android application and home system. The server analyzes the data it receives from home and send updates to the mobile and vice versa. At the same time it takes intelligent decisions about each system, such as whether there's a failure in the home system and informs the user. A database is maintained by the server and it is updated according to the changes in the home. The major components for implementing the subsystem are

• The database

• Server

• Scripting language to define services

• Communication mechanism between the server and the other components.

The server fetches the sensor values from the home server, shows the status to android user, and if user wants to perform any operation on devices , it send the signals from android user to home server by cloud network. It also updates the database in the cloud server and provides all regarding information required fot the controlling through internet network.

B] Android application

The main objective of the mobile application is providing user the basic interface to communicate with the home. It provides an illustrative view of the home and status of equipments and lets the user control them and closely monitor them with ease. In addition to that it sends alerts when there's a change in the status of equipments or in the environment being monitored. There were two possible approaches for implementing the mobile application. They are

• WML

• J2ME

According to the survey J2ME is selected as the best approach to implement the mobile application because of the following reasons.

• With J2ME we can provide better user interfaces than with WML

• J2ME applications run faster than WML applications

Jni ,Ksoap ,Soap xml, Xml layouts for android gui

C] Home Server

The home pc also provides a standard GUI for the input selection for the home users. The home system is connected to the hardware appliances so it will store the status of the devices connected to it.

The system provides the user with the following set of facilities:

1. A home user needs to logon for logging into the system. The system authenticates the user and provides him/her the access to the system.
2. System allows the user to have full control on the mobile or android user i.e. it will take care that which mobile or android user is granted the privileges to access the devices of the system.
3. The system is also able to remove the privileges of the android user for the particular home system.
4. Also system is able to assign new android users which can access this system.
5. A user can also perform the operations as setting the threshold values of the appliances connected to it, detecting failure of these appliances, etc.

## V. IMPLEMENTATION DETAILS

In Home Automation System, we need a embedded system for interfacing between the Hardware and Home User so that the request by android user can take place. For this purpose, following diagram depicts the circuit diagram for Home Automation System

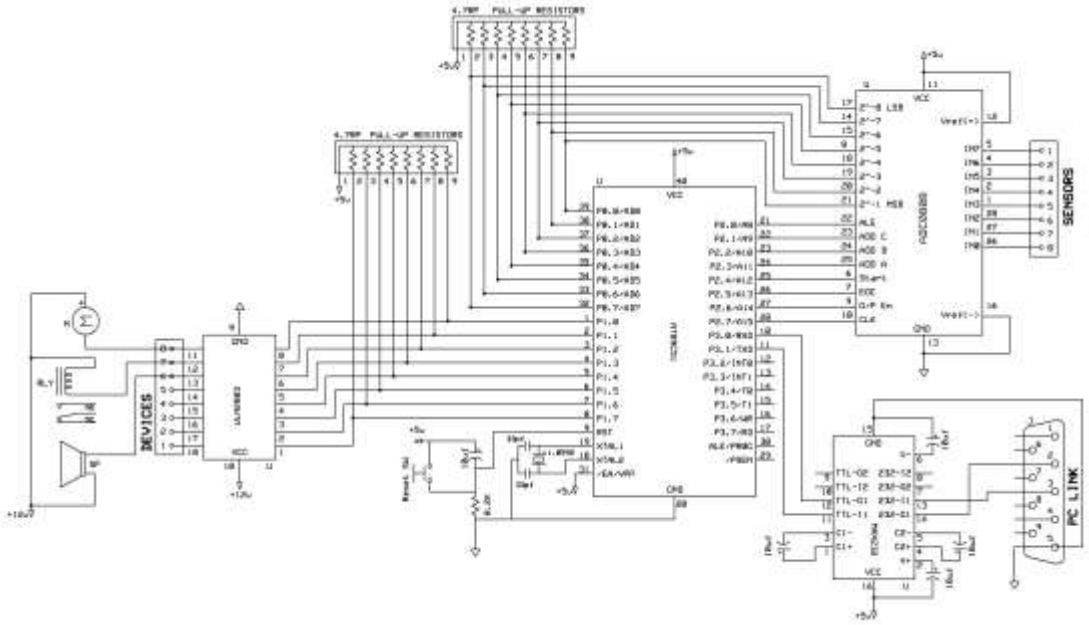


Fig 2 : Circuit Diagram for Home Automation System

Following figures shows the GUI and processing for Home Automation System in sequence :


Fig 3 : Set the Server IP for proceeding the HA System after Login

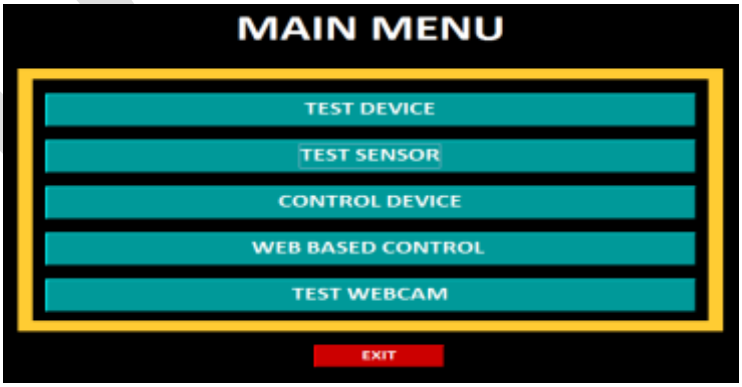


Fig 4 : Main menu of HA System


Fig 5: Environment for Device Control ,sensors values, Video Feedback


Fig 6 : Device Control for Andriod App


Fig 7 : Environment to see the Video Feedback,Device Status and Sensors Value in Android App

## VI. FUTURE WORK

We have developed the Home Automation System for the Android application but we can build cross platform system that can be deployed on various platforms likeiOS, Windows. Limitation to control only several devices in home can be removed by extending automation of all other home appliances. Security cameras can be controlled, allowing the user to observe activity around a house or business. Security systems can include motion sensors that will detect any kind of unauthorized movement and notify the user,other security feature such as open-door and motion detection, energy monitoring, or weather stations can be implemented succesfully. Scope of this project can be expanded to many areas by not restricting to only home. It is not just limited to house hold appliances, but also can be used for industrial devices or business applications. It will be flexible to support various wired as well as wireless technologies like Bluetooth, Zigbee, Wi-Fi, World Wide Web. We have discussed a simple prototype in this paper but in future it can be expanded to many other areas.

## VII. ACKNOWLEDGMENT

We acknowledge the efforts and hard work by the experts who have contributed towards development of the different home automation systems. We would like to thank our Project Guide Prof. B. D. Phulpagar for his guidance and time to time support. We also acknowledge the efforts of Mrs. KirtiMudliar, Project Coordinator Mrs. ManishaPetare and all the reviewers for the suggestions and modifications to improve the quality of the paper and to help to prepare the camera-ready copy of our paper.

## VIII. CONCLUSION

Our main objective is to provide a help to the handicapped or old aged people. A fully functional home automation system is designed and build by integrating andriod devices, cloud networking, wireless communication, and power-line communication.

- Using this system as framework, the user can control various appliances like lights and fans within their home from any location in the world through cloud network using mobile devices or PCs.
- Proposed system is characterized by support for currently trending technology such as flexibility, security, user-friendly, in addition to the existence of video surveillance feedback to inform the master about the state of the system and the appliances.
- Also using IR sensors the burglar alerts are reported to the user for efficient intrusion detection system.

**REFERENCES:**

**Reference Papers -**

[1] Al-Ali, Member, IEEE & M. AL-Rousan,"Java-Based Home Automation System R." IEEE Transactions on Consumer Electronics,Vol. 50, No. 2, MAY 2004

[2] Pradeep.G, B.Santhi Chandra, M.Venkateswarao, "Ad-Hoc Low Powered 802.15.1 Protocol Based Automation System for Residence using Mobile Devices", Dept.of ECE, K L University, Vijayawada, Andhra Pradesh, India IJCST Vo l. 2, SP 1, December 2011

[3] E. Yavuz, B. Hasan, I. Serkan and K. Duygu. "Safe and Secure PIC Based Remote Control Application for Intelligent Home". *International Journal of Computer Science and Network Security*, Vol. 7, No. 5, May 2007.

[4] N. Sriskanthan, F. Tan, A. Karande," Bluetooth based home automation system", Microprocessors and Microsystems journal, issue 26 (2002) pages 281–289, Elsevier Science B.V., 2002

[5] R.Piyare, M.Tazil" Bluetooth Based Home Automation System Using Cell Phone", 2011 IEEE 15th International Symposium on Consumer Electronics .

[6] Somak R. Das, Silvia Chita, Nina Peterson, Behrooz A. Shirazi, and MedhaBhadkamkar "Home Automation and security for mobile devices" Android IEEE 2011.

[7] DeepaliJavale , Mohd. Mohsin ,ShreerangNandanwar , MayurShingate " Home Automation and Security System Using Android ADK ".

[8] MohamedAbd El-LatifMowad, Ahmed Fathy, Ahmed Hafez " Smart Home Automated Control System Using Android Application and Microcontroller".

[9] Malik Sikandar Hayat Khiyal, Aihab Khan, and ErumShehzadi, "SMS Based Wireless Home Appliance Control System (HACS) for Automating Appliances and Security", Issues in Informing Science and Information Technology Volume 6, 2009

[10] www.smarthome.com

[11] Security and Home Automation

http://www.homeauto.com

[12] Home Automation and Smart Home Control

[13]Security and Home Automationhttp://www.homeauto.com

[14] Home Automation and Smart Home Control http://ucontrol4.com

[15] http://www.honeywellautomationindia.com