

# Home Automation System using Android application and Cloud Network with video surveillance feedback

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**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 using android application through internet or wifi connection also by using home automation we can provide home security. 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 would design the android app for controlling home system. All home appliances will be connected to the embedded circuit board which will be connected to the home PC. And through Home PC we will provide 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 and security; embedded system; cloud; android application

## I. INTRODUCTION

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 aspects 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 thresholds of the devices it is more time and cost consuming. Thus we are using more efficient way to overcome these 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 business appliances.

## II. SYSTEM OVERVIEW

- 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.

## III. SYSTEM ARCHITECTURE

The figure below depicts the overview of the Home automation system architecture.

### A. Cloud Computing

Cloud computing refers to the data storage and can retrieve the data from almost anywhere and everywhere through internet. User's can remotely store and access the personal files. Data is centrally stored, so they don't have to carry a storage medium. Cloud computing provides mainly data storage services, data access and software without the knowledge of the end-user of the physical location of the storage and also the configuration of the devices. Any computer or web-friendly device connected to the Internet may access the same pool of computing power, applications,

and files in a cloud-computing environment from anywhere and everywhere.

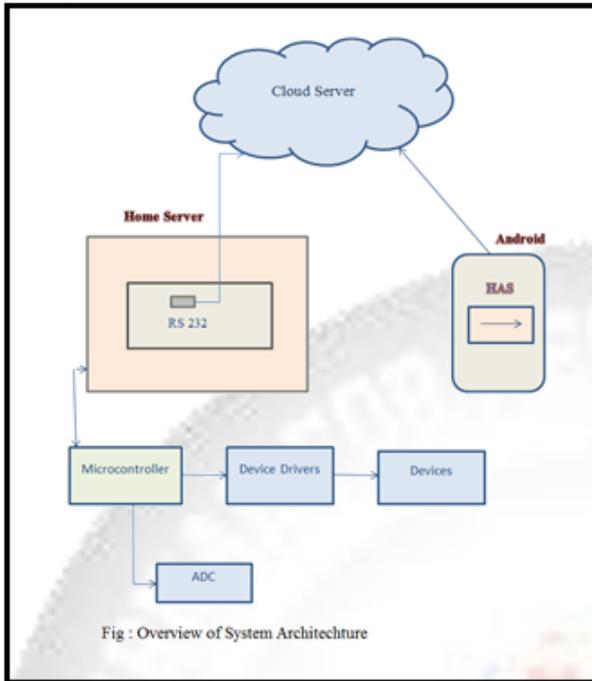


Fig : Overview of System Architecture

Types of cloud

- (1) Infrastructure as a service
- (2) Platform as a service
- (3) Software as a service

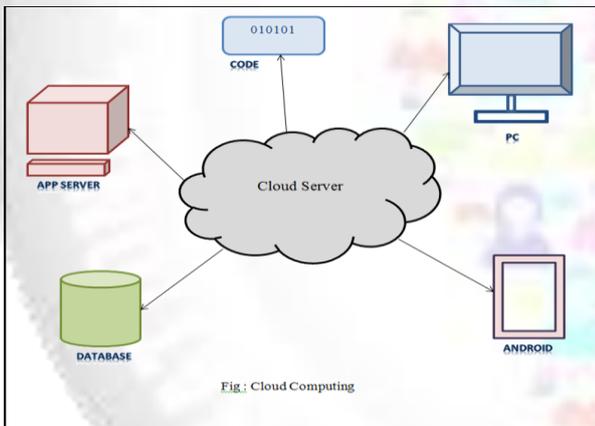


Fig : Cloud Computing

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

Java swing is used for GUI design. As java is an platform independent language the user interface can be built on any machine and deploy on any other machine having different operating system(OS).

As there are various servers used in market we use Glassfish as the server over Apache , as servlets only can run best on apache servers and glassfish is best for web servers as its execting time is faster as compared to servlets.

### B. Android Technology

Android is a Linux-based operating system primarily designed for mobile devices such as smart -phones and tablet computers utilizing ARM processors. A secondary target for the light weight OS is embedded systems such as networking equipment, smart TV systems including set top boxes and built in systems and various devices as varied as house hold appliances and wrist watches.

Android has a large community of developers writing mobile applications ("apps") that extend the functionality of the devices. Developers write primarily in a customized version of Java. Apps can be downloaded from third-party sites or through online stores such as Google Play (formerly Android Market), the app store run by Google.

Features of android are

- Handset layout
- Storage(rational database)
- Connectivity (gsm, gprs, umts, wifi etc.)
- Messaging
- Multiple language support
- Java support
- Media support
- External support
- Video capturing and storing
- Additional hardware support

## 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. FUTURE WORK

We are developing the Home Automation System for the Android application but we can build cross platform system that can be deployed on various platforms like iOS, 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 successfully. 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.

### VI. CONCLUSION

This is an on going project. Our main objective is to provide a help to the handicapped or old aged people. A fully

functional home automation system can be designed and build by integrating android devices, cloud networking, wireless communication, and power-line communication. Using this system as framework, the user can control various appliances 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.

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### 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 1. 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] Muhammad Izhar Ramli, Mohd Helmy Abd Wahab, Nabihah, "TOWARDS SMART HOME: CONTROL ELECTRICAL DEVICES
- [5] Rana, Jitendra Rajendra and Pawar, Sunil N., Zigbee Based Home Automation (April 10, 2010). Available at SSRN : <http://ssrn.com/abstract=1587245> or <http://dx.doi.org/10.2139/ssrn.1587245>  
For Information
- [6] [www.smarthome.com](http://www.smarthome.com)
- [7] Security and Home Automation <http://www.homeauto.com>
- [8] Home Automation and Smart Home Control <http://ucontrol4.com>
- [9] <http://www.Instructables.com>
- [10] <http://www.honeywellautomationindia.com>