

# **Android Based Home Automation**

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## **Abstract :**

This project presents the overall design of Home Automation System (HAS) with low cost and wireless system. This system is designed to assist and provide support in order to fulfill the needs of elderly and disabled in home. Also, the smart home concept in the system improves the standard living at home. . The switch mode and voice mode are used to control the home appliances. The video feedback is received in the android application which streams the video of IP- Camera. The main control system implements wireless technology to provide remote access from smart phone. The design remains the existing electrical switches and provides more safety control on the switches with low voltage activating method. The switches status is synchronized in all the control system whereby every user interface indicates the real time existing switches status. The system intended to control electrical appliances and devices in house with relatively low cost design, user-friendly interface and ease of installation.

## **Introduction**

The “Home Automation” concept has existed for many years. The terms “Smart Home”, “Intelligent Home” followed and has been used to introduce the concept of networking appliances and devices in the house. Home automation Systems (HASs) represents a great research opportunity in creating new fields in engineering, and Computing. HASs includes centralized control of lighting, appliances, security locks of gates and doors and other systems, to provide improved comfort, energy efficiency and security system. HASs becoming popular nowadays and enter quickly in this emerging market. However, end users, especially the disabled and elderly due to their complexity and cost, do not always accept these systems.

Due to the advancement of wireless technology, there are several different of connections are introduced such as GSM, WIFI, and Bluetooth. Each of the connection has their own unique specifications and applications. Among the four popular wireless connections that often implemented in HAS project, WIFI is being chosen with its suitable capability. The capabilities of WIFI are more than enough to be implemented in the design. Also, most of the current laptop/notebook or Smartphone come with built-in WIFI adapter. It will indirectly reduce the cost of this system.

## **Literature Review:**

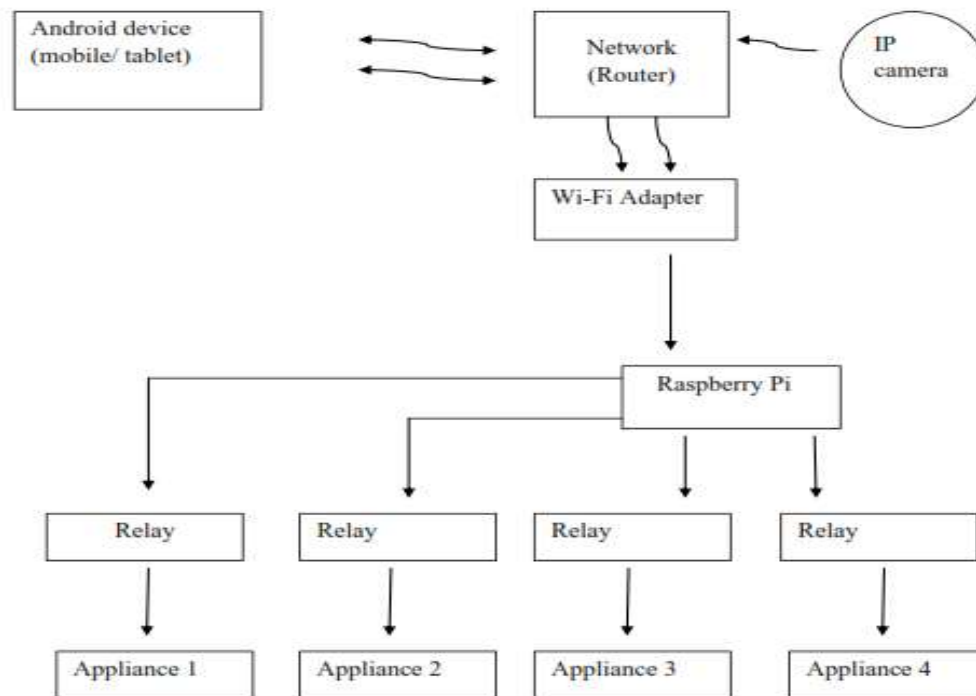
As per our survey, there exist many systems that can control home appliances using android based phones/tablets. Each system has its unique features. Currently certain companies are officially registered and are working to provide better home automation system features. Following models describes the work being performed by others.

Our designed system has application layer prototype. The application is able to synthesize the speech data

with the help of Google Voice Reorganization. The synthesized data are analyzed and further processing is carried out. In layman words, our design system provides features of controlling the home appliances using voice commands.

The use of socket programming is performed to connect the android application with the raspberry pi. This further adds security to our system. The data are received only by the server at the specified port and data are further analyzed. Our project is different in a sense it has its own software level application to control the home appliances.

### **Block Diagram :**



### **Proposed System:**

The android OS provides the flexibility of using the open source. The inbuilt sensors can be accessed easily. We have built an application with following features. Android Phone acts as a client and data are sent via sockets programming.

1. Switch Mode
2. Voice Mode
3. Video Mode

Switch mode uses the radio buttons that are used to control the home appliances. The radio button sends the status of the switch.

Voice Mode is used to control the home appliances using voice command. Using the inbuilt microphone of Smartphone, the application creates an intent that fetches the speech data to the Google server which responds with a string data. The string data are further analyzed and then processed.

Video Mode shows the video stream of the room. The captured video is streamed at the android application.

All the devices are connected to a common network. Smartphone, raspberry pi and IPcamera are connected to the common network Router is used to create a common network.

Wi-Fi Adapter is used to connect raspberry pi to the network. Raspberry pi is used to maintain the server. The pi collects the data analyses it and further activates GPIO pins as necessary. The GPIO pins of raspberry pi are connected to the relay. Relay switch are used to connect the home appliances.

## **IP Camera**

This security camera can offer you the freedom to get your home or business surveillance via network anytime and anywhere. It comes with alarm function, when somebody appears on the camera under alarm function, it will take a picture or sound the alarm and email the pictures to you immediately. IP camera can be used in various places, such as warehouse, office, supermarket, and doorkeeper and so on.

IP camera is incorporated with following features.

1. Inbuilt Microphone and Mic. These provide two way communications between remote user and the person standing in front of camera.
2. Alarm Service Setting provides the features of alarm while detecting unauthorized movement of user.
3. File Transfer Protocol Setting and Email Setting Provides the features of emailing the video stream or images at the regular interval of time.

## **Advantages of Wi-Fi over other wireless technologies like Bluetooth and ZigBee:**

Bluetooth is generally used for point to point networks and Bluetooth operates at a much slower rate of around 720 Kbps which is very small for video transfer or moving large amount of data like the image captured from a camera, whereas the bandwidth of Wi-Fi can be up to 150Mbps and very ideal for video transmission.

Wi-Fi is very much secure means of communication than Bluetooth.

Wi-Fi connection to send video, audio, and telemetry operation, while accepting remote control commands from an operator who can be located virtually anywhere in the world.

Robots are already being eyed for obvious tasks like conducting search-and rescue missions during emergencies or hauling gear for soldiers in the jungle or woods. The mechanics of the robot uses the concept that has been developed to ensure robust navigation, search and transportation in rough terrain.

## **Scope and Application :**

This system is designed to assist and provide support in order to fulfill the needs of elderly and disabled in home. Household appliances can be easily controlled via a Mobile/Tablet. Status of light, fan and other electrical appliances can be known. With the help of IP camera, video of rooms or certain area of a house can be recorded. This helps to provide security.

## **Limitations :**

Android devices having lower API version than 16 requires internet access to convert the speech data to string data. Currently, the application is made for Android Smart Phones; other OS platform doesn't support our application.

During voice mode, external noises (voice) may affect our result. The speech instruction that we command

in our voice mode may not give exact result as expected.

### **Further Enhancements:**

Looking at the current situation we can build cross platform system that can be deployed on various platforms like iOS, Windows. Limitation to control only several devices can be removed by extending automation of all other home appliances. Network can be connected to internet and Security cameras can be controlled from other places, 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. Scope of this project can be expanded to many areas by not restricting to only home.

### **Conclusion:**

The prime objective of our project is to use the Smartphone to control the home appliances effectively. The switch mode and voice mode are used to control the home appliances. The video feedback is received in the android app which streams the video of IP- Camera.

This project is based on the Raspberry pi, Android platform Java and Python. These platforms are Free Open Source Software. So the overall implementation cost is low and can be easily configured.

User can easily interact with the android phone/tablet. The user can send commands via the switch mode or speech mode. The data are being analyzed by the application and are sent over a network. The Raspberry pi acts as a server, analyses the data and activates the GPIO (General Purpose Input Output) Pins. The GPIO Pins are connected to the relays switch which activated the required home appliances.

In this way, automation process is carried out. This is a simple prototype. Using this as a reference further it can be expanded to many other programs.

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