

Raspberry Pi Based Home Automation System for Android Application

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Abstract : Now a days, the home environment has seen a hurried introduction of network enabled digital technology. For the purpose of Home automation this technology offers new and exciting chances to increase the connectivity of devices within the home. Home automation can be achieved by local networking or by remote control. Mobile devices are ultimate in providing a user interface in a home automation system because of their convenience and their wide range of capabilities. They can interconnect with a home automation network through an Internet gateway, but cannot communicate directly with devices in the network, as these devices usually appliance short power communication protocols, such as Zigbee, Wi-Fi etc. In this project we objects at controlling Home appliances via Android device using Wi-Fi as message protocol and Raspberry Pi as OS system. We create a user friendly use for the android device that allows the user to interact with the Raspberry Pi OS. The operating system will be interfaced with a relay circuit board that controls the appliances in a row in Home. The interaction with server allows the user to select the appropriate device. The server interacts with the corresponding relay. By this we offers a handy and cost effective Home automation system.

Keywords: Raspberry-Pi, Home Automation, Python, Android App.

I. INTRODUCTION

The home automation refers to native environment that improves the quality of the resident's life by facilitating a flexible, comfortable, healthy, and safe environment. Android based home automation systems become the most popular home automation system in markets recently. The remote controlling and monitoring of a house using internet requires computer, which is huge in size and hard to carry around. The different wireless communication standard to exchange data and signaling between their components, like Bluetooth, Zigbee, Wi-Fi, and finally the Global System for Mobile Communication (GSM) uses the most available home automation system. Wireless based home automation systems reduced installation cost and effort, and boost system flexibility and scalability [1].

In Home automation module there are collections of consistent devices for controlling various functions within a house. Mobile devices are ideal in providing a user interface in a home automation system their is portability and their extensive range of capabilities. . Within the house, the user might not want to go to a central control panel like a laptop, but use the phone that is sophisticated placed in closer nearness to the user [2]. When far from the house, the user might want to check its current status or even schedule actions for his return.

The concept of android based home automation system we can provide end users with simple secure and safety configurable automatic system .Also the concept can overcome the barriers in front of home automation systems and enable a home technology network that allows people to easily accept the subset of home automation technology they

appeals to their household. Home Automation is becoming an predictable thing in our fast developing environment and current life style [3]. New trends in lifestyle become enhanced the setup of automated home appliances in many places. Home automation not only refers to the automation of appliances in a house but then also automation of things that we use in our daily life such as cars, telephones etc. Home Automation of appliances was firstly introduced in offices for comfort of use and also for reduction in time and cost consumption [4]. Nowadays, home automation systems are available in a number of varieties. A few have been discussed here.

- Java-Based Home Automation System.
- Home Automation using GSM.
- Zigbee based Home automation.
- SMS based Home automation

Even if many variations of home automation systems are available, It also imposes a huge installation cost on the user or consumer. There are several methods of Android device with a dongle devices capable of Zigbee communication [5]. The use of multiple communication channels, such as the TCP channel, that uses Wi-Fi to connect to a gateway also USB channel, that can be connect to a device on the home automation system through an USB dongle. The automation system consists of two main components; the GSM modem, which is the communication interface between the home automation system and the user.

II. LITRATURE SURVEY

Home Automation Using GSM: This system exist a novel, stand alone, affordable and flexible GSM- Zigbee based home automation system. The entire system be determined by on a 8 bit microcontroller named PIC (Peripheral Interface Controller) in this work. The Database entry built around this Microcontroller and a GSM controller facilitate the heart of the system[1]. The device is connected to a Zigbee Transceiver and it interface with each and every node

present in our home. The GSM Controller facilitate for the data follow between user and microcontroller. The GSM uses mobile technology to communicate. From the mobile phone, command can be send via SMS to the Controller, which in turn understands the command and then activates the required 'switch' to control the electrical item[2]. The installation of the GSM Controller is comparatively simple and can be adapted for any current home system. Control of lights are done via the electrical circulation board (circuit breakers).The block diagram of system is as follows.

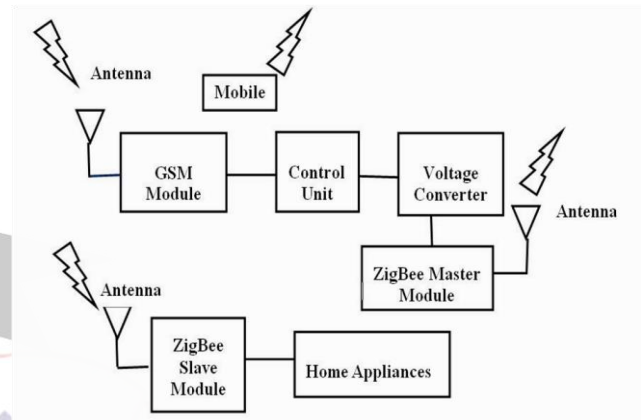


Fig. 1 Enabling by mobile devices for home automation using Zigbee.

Home automation systems are groups of interconnected devices for controlling various devices within a house, such as light control, heating, air conditioning etc. Mobile devices are idyllic in connecting user interface in a home automation system, their convenience and their wide range of abilities[3]. They can interface with a home automation system through an Internet using topology, but not directly interface with devices in the network, as these devices usually implement low power consumption protocols, such as Zigbee[4].

There are several methods to get an Android device with a dongle providing Zigbee communication. The use of multiple communication channels, such as the TCP channel, that uses Wi-Fi linking to a gateway, and the USB channel, that can connect to a device on the home automation system through an USB dongle [5]. Advanced mobile technology have embedded modules for several wireless communication technologies, like as Wi-Fi, UMTS

and Bluetooth module. The home automation system consists of various home automation appliances interconnected in a wireless sensor network, a gateway at the edge of the network and one or more client devices that can be either smart phones, tablets, or laptops[6].

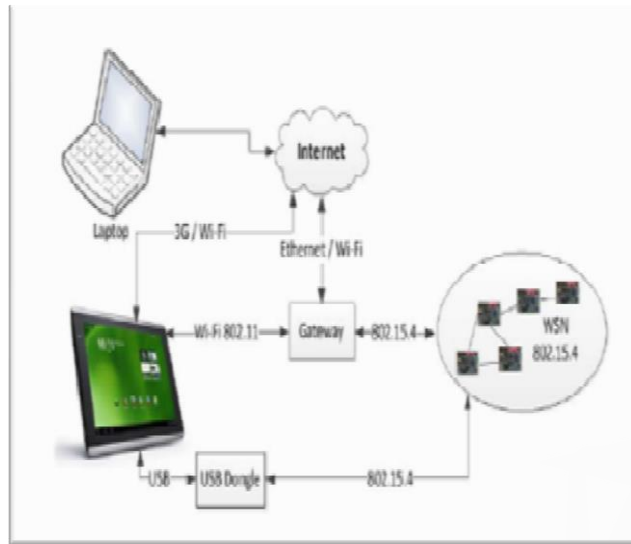


Fig 2: Home automation using Zigbee

Design on SMS Based Home Automation System. This system presents design and model of implementation of a basic home automation system based on SMS technology. The home automation system consists of two main components, The GSM modem, which is the communication interface among the home automation system and the user. GSM module uses SMS technology to alter data, and signaling between users and home automation system. The second is the microcontroller, which is the fundamental of the home automation system, and execute as the link between the GSM network on sensors and actuators of home automation devices [7]. Sensors and actuators are directly connected to hardware micro controller through appropriate interface. System supports large amount of home automation appliances, manage power components, security, multimedia applications, and telecommunication technology. System security based on user authentication of each SMS being change, as every SMS contains user name and password [8].

III. PROPOSED SYSTEM

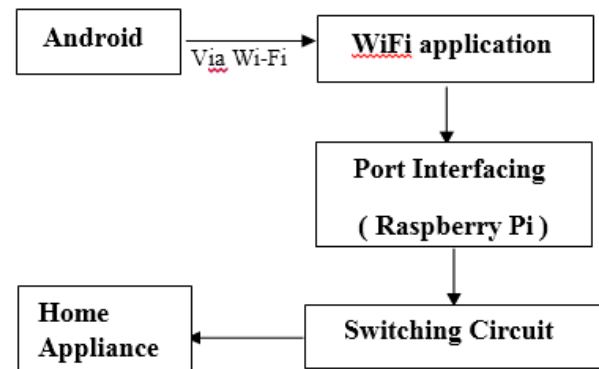


Fig. 3 Proposed system Block Diagram

Above Fig shows that in our system the phone acts as a server or the controlling device application. Thus it acts as a central control, which acts as a user interface device where the user controls the appliances control through touch screen commands on the phone. The control is interface to the lab view application through Wi-Fi. The component, which is interfaced with the lab view application, is the port's interfaced which is directly interpreted with the switching circuitry. The switching circuitry is in hold of the devices to be automated [9].

The proposed home automation system is working with very prevalent android phones. It is having mainly three components; The android enabled user device, a wifi router having a good extendable range, and a raspberry pi board [9]. Here the users have facility to control the home appliances through android enabled application. It will be increase the system functionality with there is no required for a wired connection, internet etc. The command from the user will be transmitted through the wifi network .The raspberry pi board is configured according to the home system and it can enable the relay circuit as per user demand. The relay circuit also control the home appliances also. We can add appliances to the system also can add additional security features [10].

The key objective of the proposed system is to design and to implement a inexpensive and open source home automation appliances that is capable of controlling and automating most

of the house appliances through an android application. The new system must provide the following features

- It allows a good range of scalability.
- It provides security and authentication.
- Additional vendors can be easily added

IV. CONCLUSION

The system as the name indicates, 'Android based home automation' makes the system more flexible and provides attractive user interface compared to other home automation systems. In this system we interconnect mobile devices into home automation systems. A novel architecture for a home automation system is planned using the relatively new interfacing technologies. The system consists of mainly three components is a wifi technology, raspberry pi board and relay circuits switches. Wi-Fi is used as the communication channel between android phone and the raspberry pi board. We hide the complexity of the symbols involved in the home automation system by including them into a simple, but inclusive set of related conceptions. This interpretation is needed to fit as much of the functionality on the limited space accessible by a mobile device display.

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