

Android Based Home Automation using Raspberry Pi

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Abstract— In today's society automation is performing an essential role in any individual's day to day life. Home Automation is become more advantageous because of its simplicity and it is highly efficient in our daily life. This paper is entirely based on low expense and secured home control monitoring system for reaching and managing devices and appliances remotely using Android-based Smartphone application. There is enough potential and reach for remote access, command and monitoring of such network-enabled devices. In this system, numerous technologies like Bluetooth, Wi-Fi, Arduino are applied for communication, and several accessories like laptops, smartphones used to control these appliances. Keywords- Home Automation, Android, Bluetooth, Wifi, Arduino, Smartphone.

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I. INTRODUCTION

In this modern era because of modern based technology, Home Automation has become quite helpful for disabled people. A home automation system proposes to allow users to command and operate appliances even via voice. If considering several home automation systems, they have invariably strived to provide efficient, helpful, and secure ways for home inhabitants to access their homes. Even though the shift in growing technology, user's hope or change of time, the need for a home automation system has remained alike.

In this system, home appliances can be supervised, and the user can administer the system through a convenient interface. Various home appliances like fans, bulbs, switches are casually commanded through the main control board. By using the Internet of Things (IoT), home automation can be easier and secure. Internet of Things (IoT) is nothing but connecting different real-world gadgets to provide communication and inter-connecting between various devices is also known as "Things". Automation plays a frequently essential role in daily to day life. Engineers try to link automated things with analytical and organizational means to develop compact systems for a fast-expanding variety of applications.

II. CHALLENGES OF HOME AUTOMATION SYSTEM

The arrangements admit four main challenges; Modules in the system are not consolidated, abnormal functionality, the objection in delivering surety in terms of security and inadequate in terms of characteristics. The foremost goal of this research is to compose a system utilizing IoT that is proficient in managing and automating most of the house appliances through an easily flexible web interface. The proposed arrangement has high flexibility by using Wi-Fi and Bluetooth technology to interconnect its distributed sensors to the server. This will minimize the deployment

value and direction to improve the ability of upgrading, and system reconfiguration and re-establishment.

III. PROPOSED SYSTEM

The offered method is composed in such a way that it bypasses the restriction of the present system. The arrangement is executed using a raspberry pi, android application from which you can command the devices and relay circuit. The home automation system which is designed is more reliable, scalable and extensible. The wifi signal should be stable so that devices can manage the appliances. Appliances can be controlled through the relay. Through the android devices, we can control the home appliances that are reasonable and reliable from a user's point of view. The main advantage of home automation is that it reduces the human effort and provide security. It will help to save electricity when not in use.

IV. SYSTEM ARCHITECTURE

In-home automation several new designs and efforts have been made. The theory of home automation is still growing. The structure incorporates various sensors, WIFI module, relay circuits, android based application and Raspberry pi which is a small-sized module that is used for the idea to control the network and for indirect access. Users can handle the system through the WIFI network by Raspberry Pi and manage according to his or her needs. But the condition is that the WIFI signal should be stable and the system is changeable. Devices can be controlled through means of the WIFI. Configuration should be previously maintained to access the services. To configure the WIFI with Raspberry Pi various network/interface components are required. The serial data which are coming from the WIFI is connected to the Raspberry Pi circuit. The heart of this Home Automation System is Raspberry Pi which is small in size and performs various functions. Each home appliances are provided with a relay circuit. On behalf of the relay circuit, the devices are performing their respective function. Home automation is required to have a very easy installation. The project consists of 4 main modules which are as follows:

- 1) Android Application
- 2) Raspberry pi
- 3) Relay circuit
- 4) Wi-Fi

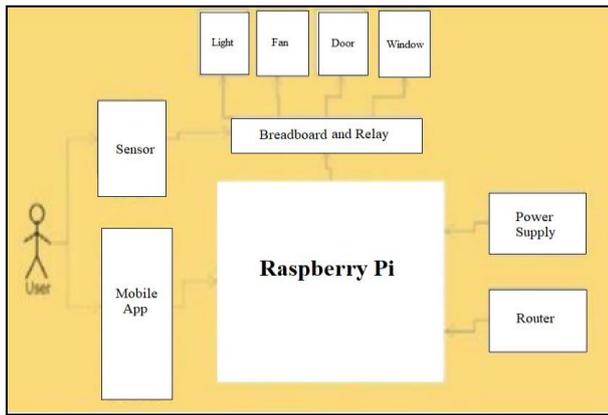


Fig. 1: System Architecture

V. DEVELOPMENT PLATFORM

A. Android:

Android is basically an operating system that is developed by Android Inc. which bought by Google in 2005. In the home automation system, we use the Android operating system through which we can control this system from remote places. The graphical user interface is created using android so that the user can easily manage the home devices. The mobile device is used to control this system. There are many UI segments and a design check that permits to build the user interface. Android also offers additional UI functions for special interfaces such as dialog boxes, notifications alert, and drop-down menu options. The interface should permit the user to see the device situation and manage the devices.

B. Raspberry Pi:

The Raspberry Pi performs many functions as a computer but its size and cost are far less than the computer. It is a single board chip. Raspberry pi computerizes home appliances and grants users to control them efficiently by the Internet from all over the world. It is regulated by the revised version of Debian Linux optimized for the arm architecture. It is the heart of the home automation system is working on model B,700 MHz ARM processor with 512 MB RAM. The setting up of Raspberry Pi consists of choosing Raspbian OS from the noobs package. The noobs package consists of several operating systems like Raspbian, Linux, Pidora, open ELEC, RISC OS. After the selection of the operating system from the noobs package, we need to authenticate and configure raspberry-pi by Rasp i-config command. We can begin by entering into RASP I desktop using the START X command. The interface between the Raspberry Pi and the external world is done by WebIOPi. It is an internet-based application that permits regulating Raspberry Pi's GPIO. It Supports REST API over CoAP and HTTP. WebIOPi can also manage various devices at a time i.e. more than 30 devices including ADC, DAC, sensors. Its interface allows better control of Raspberry Pi.

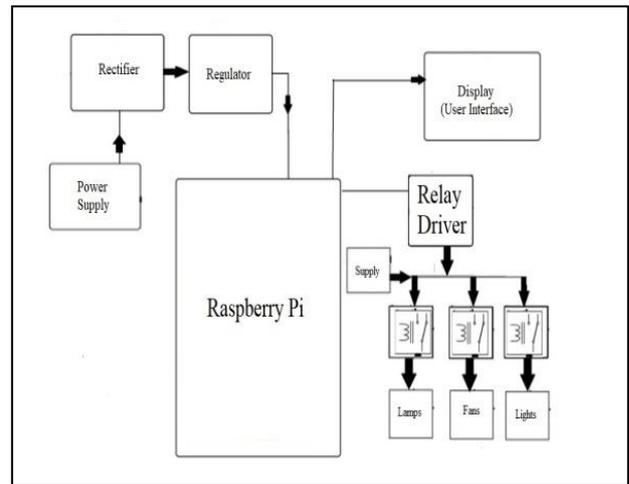


Fig. 2: Raspberry Pi with Devices

C. Relay Circuit:

A relay is like a switch which is electrically operated. Relays are used to control a circuit with low power signal or where several circuits must be controlled by one signal. The relay circuit is given the output which is generated by the raspberry pi. Due to this the relay will turn on and the device will work. NPN transistors are used in relay. According to the purpose of our application the relays can be selected.

D. Wi-Fi:

Wifi is generally used to communicate wirelessly i.e used for local area networking and internet access. It is based on the IEEE 802.11 family of standards. I used this technology in my project to remotely communicate through the system in the absence of the user.

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