Voice Recognition cum Real Time Sensor Application based Home Automation using Raspberry Pi Device

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Abstract:
In this technique, we are trying to connect the household devices using Raspberry Pi 2 and an Android Smartphone. This is basically an Internet of things (IoT) concept. As we all know the Home Automation Concept has become very popular because of its numerous advantages. We will use an Android Application which will control the devices in the house. The Raspberry pi 2 will be connected to the devices and take the order from the users and manipulate or make changes according to that. The result produced will be desirable as it has low cost and low consumption of energy.

Key words: Android system, Web server, Raspberry pi card, Electronic components.

I. INTRODUCTION

Home Automation is the concept aroused due to the advancement in the electronic components mainly the system on chip, ie. SoC. SoC mainly includes of the embedded systems like micro controllers which are small but provide a complete working environment like a computer. Home automation provides comfortness, convenience, and the main reason for its use is the low energy consumption. Home automation has the ability to play an important role in the advancement and progress of Internet of Things. A home automation system is a technical solution that helps automating the group of electronic, electrical and technology-based targets within a house. It uses a combination of hardware and software technologies that enable control and management over appliances and devices within a home. A home with an automation system is also known as a smart home [1].

According to Bromley’s definition, Home automation can be defined as the “introduction of technology within the home to enhance and standardise the quality of life of its occupants, through the provision of different services such as telehealth, multimedia entertainment and energy conservation”. We have an existing technique to handle a raspberry pi embedded system using the python environment. But since we are working with the android smartphone, python will not be used, and its alternative ‘java’ which is the language used for android will be used to manipulate the raspberry. We have other Embedded systems like Arduino which can act as an alternative to the Raspberry. Now since Arduino is not as powerful as Raspberry, it will slow down the process and surely will not be used for real time tasks. So basically this technique will provide an web interface to take input from the user to switch on or off the household appliances connected to raspberry pi.

II. SUMMARY

All the users who are experiencing in the current and existing system may think of a system that may add more flexibility and run with the common applications running on android. The proposed system is designed in such a way to avoid the limitations of the existing system. The proposed system supports more flexibility, comfort ability and security [4]. This model targets at the home automation using raspberry through a webpage interface and the predefined algorithm given by the default programming environment python provided by the raspberry developers. Home appliance network (home automation) is required to be without new wiring and to be very easy installation. Field of home appliance network is still young, many initiatives and standardization efforts have already been made. The new kind of system brought android and raspberry-pi into home automation implementation [4]. With the explosion of internet based and related technologies, and the entire supporting internet framework, the home system looks feasible to enter this arena. Efforts in such direction will help to realize a genuine wireless, fully auto-running home automation system for the benefit of elderly and disable people or day care centre [3]. Although smart tools have been accessible in the past, their use has been very limited because they require intercommunication. One preferred and suggested solution is to connect all smart phones using hard electrical wiring [5]; however, the resulting portability problem then produces an order for a wireless network able of accepting the devices. Organizations have therefore developed management, supplementary services, and gateways for smart devices [5]. Smart home network technology has been installed in various systems, such as power line and radio frequency systems [5].

Figure 3.1. System Architecture Diagram.
III. SYSTEM OVERVIEW

The home automation system consist mainly of five things as follows:-

[a] User Interface: - In this project, the user interface will be the web page consisting of the buttons corresponding to the devices or the appliances present in the house. User will be able to handle the appliances by clicking the required option. Android will also be providing other UI modules for special interfaces such as dialogs, notifications, and menus. The interface should allow user to view device status and to control device.

[b] Wifi Router Configuration: - The wifi unit provides the medium for communication it can be also configured to make security services. The wifi should be configured with a certain address and user commands will be directing through wifi unit. You may use sudo nano /etc/network/interfaces for configuring wifi with raspberry pi[4].

[c] Raspberry Pi 2: - Raspberry pi is an embedded system which is debian optimized having ARM processor. It is a single “on chip” computing hardware.

<table>
<thead>
<tr>
<th>Sr.no</th>
<th>Features of Raspberry Pi</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RCA Video Port</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>HDMI Port</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Ethernet Port</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>USB Port</td>
<td>2x2.0 Port</td>
</tr>
<tr>
<td>5</td>
<td>3.5mm Audio Jack</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>SD Card Slot</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>Micro USB Power Port</td>
<td>Yes</td>
</tr>
<tr>
<td>8</td>
<td>Memory</td>
<td>1 GB</td>
</tr>
<tr>
<td>9</td>
<td>CPU</td>
<td>Broadcom 900MHz</td>
</tr>
</tbody>
</table>

[d] Relay Board: - A relay is an electrically operated switch [4]. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), where several circuits must be controlled by one signal in our system the output from raspberry is directly given to relay circuit. According to the out of raspberry, corresponding relay will turn on and makes it’s device working.

[e] Appliances: - Appliances are the basic electronic devices of the house which is to be handled or manipulated using Raspberry. It can be a light bulb, fan, AC, etc.

IV. PROS and CONS

Pros

a) Scheduling function to turn on and turn off electrical device worked as planned.
b) [2] Database used on Raspberry Pi could maintain the last state of the switch. Thus, in a case of system failure, whole system will be restored to prior condition before the failure occurred.
c) Web based interface could be deployed to control electrical device remotely. Those would work on any platform that support web browser[2].
d) Voice command could be used in future to manage the state of electrical device.

Cons

a) The system could only monitor digital state of the switch. Thus, this system could not manage ambient device.
b) Scheduling system activated approximately 1 minute after raspberry activated[2].
c) [2] Voice command controller performance is relied on internet connection therefore it is expected to have a noticeably delay on poor internet connection area. Obviously could not be used without internet connection.

V. CONCLUSION

This paper shows that the automated home could be build using relatively cheap and widely available SBC like Raspberry Pi [2]. This main contribution of this research is providing automated home or smart home with seamless Operation of the system by the means of voice command, offering new experience in their home. However, detailed configurations of the system could be performed remotely via web [2]. User could use computer, laptop, table or even smartphone as long as it has web browser. The remote control includes software and hardware components such as web server, smart phone, Raspberry pi card and an interface card[5]. Many codes have been developed and stored in the web server, smart phone and the raspberry pi card. An interface card has been realized to update signals between the actuator sensors and the raspberry pi card. The application has been installed and tested. [5]
This work can be generalized to remote command of multiple domestic equipments. In addition, it may be more autonomous, more practice, and quite scalable saw the giant step and progress in the areas of technology and communication in our time.

VI. REFERENCES


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