

Home Automation for Blind People

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Abstract:

This project is intended for blind peoples, who can't operate the physical switches, to control the overall Home Automation System (HAS). This system is designed to assist and provide support to fulfill the needs of visually impaired persons 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. In voice mode of operation, we can control the appliances through a voice command. These voice commands are processed using an android application and required operations are performed. The Android smartphone is connected to Raspberry pi board through a Wi-Fi network and it process the commands from the user. 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.

Keywords Home Automation, Raspberry pi, Python Language, Relay, Bluetooth

1. 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, visually impaired people may not use HASs easily since their blindness. 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.

This project aims towards such people to help them in using the existing Home Automation System. They can use the system through various voice based commands. These commands are interpreted using an Android smartphone which is connected to Raspberry pi through Wi-Fi. This helps the blind people to use and to control the home appliances effectively. This project uses Raspberry pi and an Android smartphone. Raspberry pi provides the features of a mini computer, with additional pins where other components and devices can be connected. The home appliances are connected to the input/output ports of Raspberry pi and their status is passed to the raspberry pi. The android running OS in any phone connected to a network can access the status of the home appliances via an application.

2. Related work

Smart home is not a recent term for science society but still far more away from people's audition and vision. As electronic technologies are approaching the field of home automation is elaborating. Manifold smart systems have been proposed where the control is done via, internet, short message service (SMS) base, Bluetooth etc. Bluetooth capabilities are better and almost all current laptop/notebook, cell phones and tablets have built-in adaptor that will indirectly diminished the cost of the system. However it restricts the control within the Bluetooth range of the environment while most other systems are not too feasible to implement as low cost solution. Existing system is based on Arduino Ethernet, which is used to eliminate the use

of a personal computer (PC) keeping the cost of the overall system to a minimum although voice activation is incorporated for switching functionalities.

3. Proposed implementation

System design

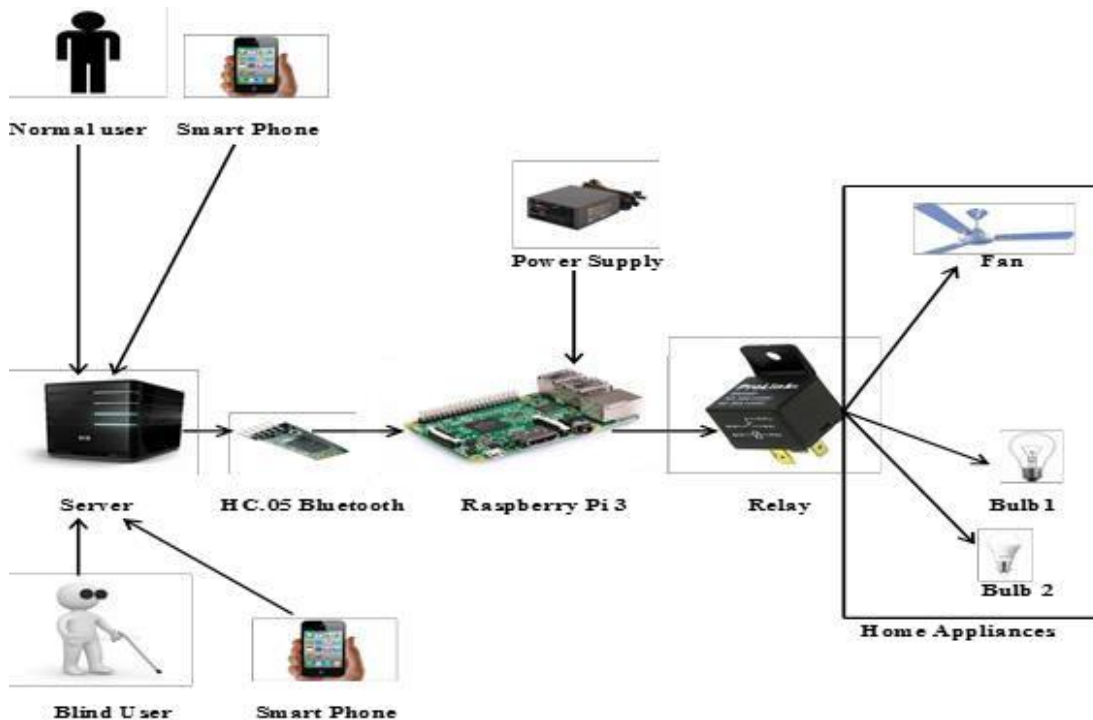


Fig3.1.The complete Architectural Design

Description

The appliances of the home are connected to the raspberry pi core .The status of the appliances is been fetched and uploaded to the server .From the server we can access to the web page or to the android .We can check the status of the appliances which will be “on/off”. We can control the status of appliances.

Architecture includes following components such as bulb1, bulb2, relay, raspberry pi, Bluetooth, Server and Smartphone and power supply .All the devices are interconnected to each other .

4.Hardware Description

1.RASPBERRY PI : It is a credit card sized computer originally designed for education. Raspberry pi is open hardware ,with exception of the primary chip on the raspberry pi which, Runs many of the main components of the board CPU, graphics, memory, USB controller etc. It is used to read the status of all device that are connected and uploaded the data in the server.



Fig4.1. Raspberry Pi3

2.Relay: Relay which is an electromagnetic switch operated by relatively small electric Current that can turn on or off a much larger electric current .Relay control one electric circuit by opening and closing contacts in another circuit An relay is connected to raspberry pi in above architecture.



Fig4.2. Relay module

3.Bluetooth Module:HC-05 Bluetooth module is shown in Fig:4.3.It is wireless technology standard used to exchange the data between two Bluetooth devices within the range of 10m approximately .It Operates in the frequency range from 2.4GHz to 2.4835 GHz.The module dimensions are 12.7mm *27mm.



Fig4.3. HC-05 Bluetooth module

5.Software Design and Working

Python language is used to develop the code for the speech based home automation system .It is high level programming language that widely used for Raspberry pi applications.It supports object oriented ,imperative and functional programming styles.It has standard library and automatic memory management.The python coded program is dumped into Raspberry pi board.

Fig5.1 show the flowchart of various events that take place at the home system.The Raspberry pi board is powered on and initialized using the Extra puTTY Software and it is used for logging into Raspberry pi. The Python coded program is dumped into Raspberry Pi board.

First installation has to be done ,When we open android application ,In order to differentiate between blind user and normal user configuration page will be displayed on screen ,confirm the application is whether user is blind or normal after that for normal user they have to login and for blind people they have to provide voice command as input . Confirm the application is whether user is blind or normal. After that for normal user they have to login. Normal people can check the status of the appliances which will be “on/off”.

For blind people they have to provide voice command as input.The Voice Command are sent to Raspberry Pi using app installed in smart phone, when they are at home.

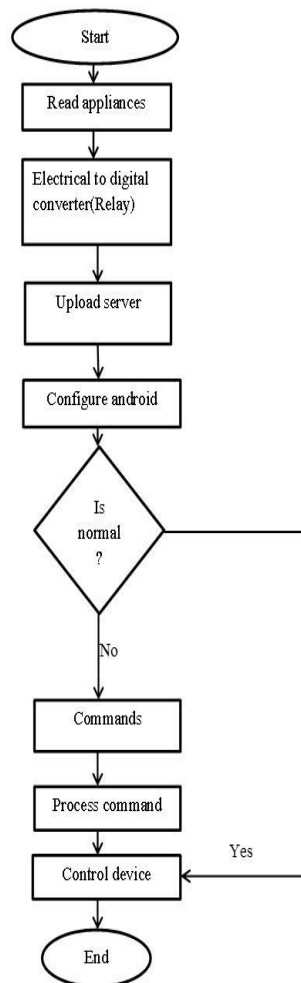


Fig:5.1 Flow chart showing various event that take place in home system

Conclusion and Future Enhancement

Conclusion

The proposed project provides security and various ways to control the devices in the house, it makes ones living comfortable and at the same time easily accessible through portable devices like mobile phones. This system is designed to assist and

Future Enhancement

By interfacing various sorts of sensor, we can program the automatic controlling of the appliances. As for example, using temperature sensor to log the current temperature of a room, we can control the automatic turning ON/OFF of the heater or fan. Likewise, for the continuous streaming of video, we can set up our own video server. This is surely cost a lot. We could interface Arduino to raspberry pi so that we can increase the number of appliances that can be controlled remotely.

References

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provide support to fulfill the needs of visually impaired persons in home. It gives the administrator all the rights to decide which makes it reliable as it always asks before taking a decision, which helps when there are necessary decisions to be taken and they can be taken fast in case of an emergency.
