

An IoT Based Smart Home Automation using Raspberry Pi

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Abstract— Home automation is an existing field that has exploded with new technologies. It provides a promising opportunity for designing smart home systems and applications. Home automation concept includes how each device forms a small part of the internet, by which the advanced system is able to interact and communicate, maximizes safety, security, comfort, convenience, and energy-savings. The implementation of proposed work is controlling home appliances using Raspberry Pi. Raspberry Pi is an inexpensive, fully customizable and programmable small computer with support for a large number of peripherals and network communication. The smart home control device is an open-source Wi-Fi enable where all the appliances (light bulb, fan, ac etc.) are connected to the raspberry pi board, and this board is connected to the Wi-Fi by using Wi-Fi module. We give a command to raspberry pi using our laptop. This is very useful for the aged as well as for the physically challenged people, easy to be used for the long halls where a number of switches are more. In today's smart city life everything is automated. To switch ON the ac we need the remote control which we may forget where we had placed it the last time.

Key words: Raspberry Pi, Home Appliances, Relay

I. INTRODUCTION

The "Internet of Things" –IoT, can be viewed as a highly dynamic and widely distributed network system. In other words, it is a system comprising many identifiable components that are able to communicate and to interact, either among themselves or with end-users or other entities in the network[1]. This system uses three loads to demonstrate as house lighting and a fan.

The idea of home automation has been used for time utilization. The advantage of Home automation is used for aged and disabled persons. It may offer a foreign interface to home appliances or the automation system itself, via the telephone line, wireless transmission or the mobile internet, to produce control and observance via a smartphone or browser. This proposed process can describe the approach that we implementing and manage numerous home appliances with the use of web services.

In the IoT "things", can refer to a wide variety of devices such as biochips, implant monitoring, hospitality, a lot of home appliance things. It is used in various kind of sources. The evolution of IoT would be grown largely. The main advantage of IoT is connecting all the physical things to the electronics through via internet. In this kind of process lot of advantages could be got by human beings. In the foreign countries, It would be developed well. In the same time, in our country, it will be developing. In the future all the homes and cities adopted by smart home and smart cities. The IoT will reach the peak place compared with other hardware. In the future generation, the world would be functioned with smart things only using IoT.

II. OBJECTIVE

This proposed system is to implement an affordable amount, reliable and scalable smart home system that can be used to remotely switch on or off any home appliance.

To Monitor the power of home appliances using a current sensor. To implement the system to monitor the home appliances. Then intimate to the user through Wi-Fi.

III. SYSTEM OVERVIEW

The purpose of hardware interface unit is all the electronic home appliances are connected to the raspberry pi board which is connected to the Wi-Fi by using Wi-Fi module. All the electronic appliances are operated and controlled by our smartphone or computer or tablet.

Raspberry PI 3 is interfaced with either PC or Mobile Phone by Using Web Protocol. Raspberry PI is connected to Electronic Switching System. By Using Electronic Switching System we control various electrical devices like Fan, Tube Light etc.

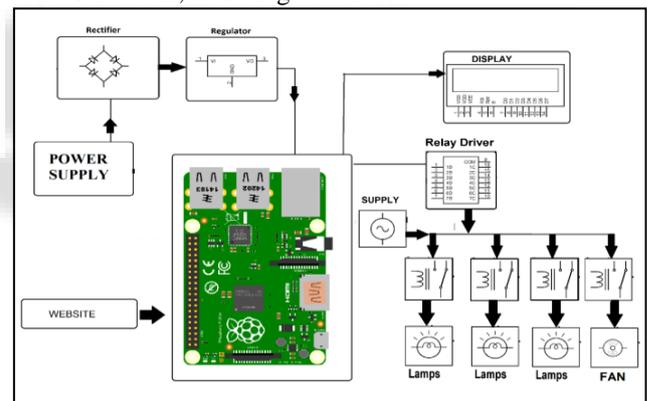


Fig. 1: System Architecture of Home Automation

Components connected to raspberry pi-3 is relay driver. The relay driver is connected to three electrical appliances such as light, fan, and bulb. Raspberry Pi-3 having inbuilt wi-fi. In this system, human controls home appliances in anywhere. In proposed work, I use localhost. The relay driver is connected to the Raspberry Pi-3 microcontroller. A Relay is electrically operated switches, which allow low power circuits to switch a relatively high voltage or current on/off. For a relay to operate a suitable pull in and holding current should be passed through its coil. Relay coils are designed to operate from a particular voltage often its 5V or 12V. The function of relay driver circuit is to provide the necessary current energizes the relay coil when a LOGIC 1 is written on the PORT PIN thus turning on the relay. The relay is turning off by writing LOGIC 0 on the port pin.

IV. RASPBERRY PI-3(MODEL B)

The Raspberry Pi-3 is used in my model. Raspberry Pi is a single board computer with Linux or other small operating systems. It was developed by Raspberry Pi Foundation in the UK for the use of computer science education. The second version of the Raspberry Pi is used in proposed work. This part describes models of Raspberry Pi is available. This report will not attempt to provide full specifications but an overview in order to help in making the decision as to which device it is required to accomplish the objectives in question. Currently, five Raspberry Pi model do exists. They are Model B+, Model A+, Model B, Model A and the Compute Module(currently only available as part of the Compute Module development kit).All these models use the same SoC (System on Chip combined CPU & GPU), the BCM2835, but other hardware features differ.

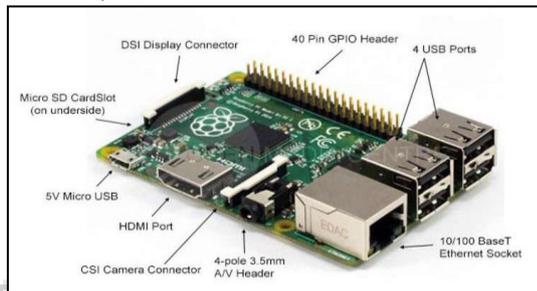


Fig. 2: Raspberry Pi 3

The Raspberry Pi is a microcontroller. It looks like a single circuit board. It is basically a tiny computer on a single circuit board and students learning about electronics and programming in mind. It is very low powered compared to a regular computer, meaning that it can be left on all of the time without racking up your electricity bills too much, and it can easily be connected to a range of peripherals and other circuit boards.[5]

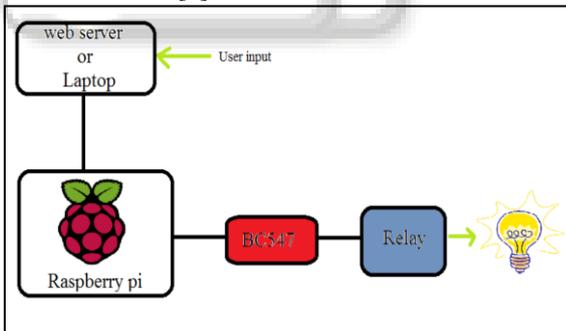


Fig. 3: Sending Command to the User

The sending command is used to send the commands. The server-side program should be run using inputs from the client side. The client sends the input to the server. That means the web server. Then the web server passing the input to the Raspberry Pi. It would be functioned with the relay. Then the relay process with home appliances. Here, we will be using commands to turn a light ON/OFF. When we pass the command to turn ON a light through the server side script, the information is relayed to the Raspberry Pi and its GPIO pin turns ON a relay. The system also sends status updates to the server on whether the light is ON/OFF.

The receiving command of the server side script running on our laptop or on a web server takes input

commands from the user and correspondingly sends it to the client (Raspberry Pi). Here, we will be using commands to turn a light ON/OFF. When we pass the command to turn ON a light through the server side script, the information is relayed to the Raspberry Pi and its GPIO pin turns ON a relay. The system also sends status updates to the server on whether the light is ON/OFF.

V. RELAY

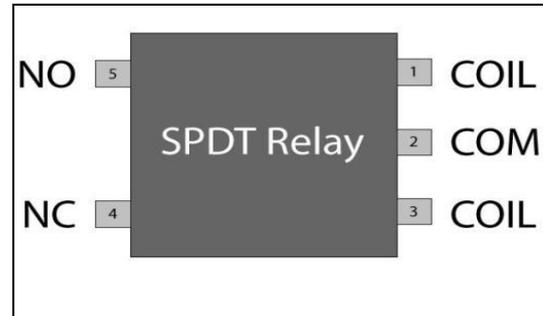


Fig. 4: Relay Configuration

A Relay is electrically operated switches, which allow low power circuits to switch a relatively high voltage or current on/off. For a relay to operate a suitable pull in and holding current should be passed through its coil. Relay coils are designed to operate from a particular voltage often its 5V or 12V. The function of relay driver circuit is to provide the necessary current energizes the relay coil when a LOGIC 1 is written on the PORT PIN thus turning on the relay. The relay is turning off by writing LOGIC 0 on the port pin. In our system, four relays are used for device control. SPDT-Single Pole Double Throw A common terminal connects to either of two others.

The two main configuration of the relay are

A. Normally Open (NO)

In the normally opened function, it would connect the circuit, when the relay is inactivated. The circuit is disconnected when the relay is active. Normally open contacts stay open until the button or switches is fully engaged.

B. Normally Closed (NC)

In the normally closed function, it would connect the circuit, when the relay is activated. The circuit is connected when the relay is inactive. Normally closed contacts stay open until the button or switches is fully disengaged.

VI. CONCLUSION

When the switch in the web page is ON then the tube light is getting ON. When it is turn OFF the tube light is getting OFF. When the switch is press ON then the fan rotates when the switch is press OFF then fan stops rotating. Control the home appliance using localhost web server. All the devices are controlled by the web pages. The usage of power could be monitoring using the current sensor.

Design a smart home to be controlled by the Raspberry Pi via the IoT. This system is also equipped with automated lights and virtual switches for controlling lights and appliances in the home remotely using external or internal networking with the Raspberry Pi via an HTML

page. In future, Raspberry Pi can play a very important role in designing smart home with very low cost. A smart home can be developed using Raspberry Pi with full of energy.

In future to control all home appliances using RPi. Then monitoring the garden via smartphone using IoT.

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