Ducasa automatics using internet of things

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ABSTRACT

Automation is the process of controlling system or appliances by automatic means as the name suggests to simply reduce human intervention to a minimum amount and to make life easier for the humans. Automation term was coined from the automobile industry which means increased use of automatic devices and control mechanized devices. Automation is a technology which was developed to do different processed by using programmed commands and provide proper feedback to the human when used. The automated system resulting performs the instruction given with very less human intervention. Automated systems are based on usage of computer and computer programs and the related technologies. With time, the development of the automated system has become complex and sophisticated. The main advantage of automated systems is to provide ease of use of appliances or systems near-human with less human intervention. Automation helps to control the electric appliances in the home office via the Internet which can be done by using various computer-related technologies like Raspberry Pi, Arduino Uno etc. In this project, we are using Raspberry Pi. Raspberry Pi is a credit card sized computer. It is a series of small single board computers developed by Raspberry Pi Foundation which is based in the United Kingdom. It is used in small-scale projects by students. It is equipped with GPIO pins (General Input/output Pins).It uses an operating system Raspbian which is developed for Raspberry Pi itself. Raspbian is a Linux based OS.

Keywords: *Internet of Things, Network, Automation, Sensors, Gateway, Raspberry Pi, Home.*

1. INTRODUCTION

Motivation

As we were moving in the 21st century people all around the world were getting busier to earn a good living. So there was a need for a technology which would make the life of humans easier in this busy schedule. There was a need of a technology which would make their basic tasks much easier and make lives easy. Therefore Automation was introduced.

Automation is a technique or method which is formed for doing normal day to day tasks much easily and with less human assistance required that is the system would require less human intervention. Slowly and steadily, Automation was used in industries and at home.

Home automation was one of the more interesting field where automation was introduced. Home automation simply means automatic home which by itself means that the basic operations or tasks to be performed in our homes would get automatic and would require no manual efforts. Home automation was based on Internet of things. With the formation of Internet, we humans found the easiest way to connect to world around us. When the Internet boomed in the late nineties, the was an idea developed of connect the devices and objects around us with the internet so that it can communicate with other devices through the Internet. IoT which is the short form of Internet of Things. IoT is the concept of connecting any device with an On/Off switch with Internet. These devices include coffee maker , washing machine , headphones, TVs , Air Conditioners , security cameras etc linked together smartly over the Internet to make their use easy and let the humans use it easily and wherever they want to over the Internet. Humans using Home Automation over the Internet at any place where there is Internet services available and can use the appliances at their homes with the use of hands from sitting anywhere in the world. Home automation has become more efficient with the wide use of smartphones. Companies were formed for home automation where they for application for different smartphones and their operating

systems and people can use Home Automation from different companies and can use the appliances at their home with the help of smartphones and application.

House automation is automation of the home or home activity. Home automation involves controlling bulbs, fans , lights, appliances, and other systems, which would provide more convenience, more comfort, less power consumption and better security. The idea of home automation has been there for some years now and has kept on evolving and many products have been there on the industry since then. Home automation also provides comfort and help for the many aged and disables people as they find it difficult for moving from one place to another for using the appliances. For example Home automation makes it easier for the old aged people to open the door by just sitting in their place with the use of their device .Also it makes it easier for a businessman or shop owner to keep an eye over the their work place through the security camera where the output of the cameras can be seen anywhere using the devices they have. In this project, we discuss Design and Development of Activation and Controlling of Home Automation System via the web or android application using Raspberry Pi. It predominantly concentrates on the control of home appliances remotely when the person is far from the appliance. This project is primarily concerned with the programmed control of light or whatever other home appliances through Android mobiles or web application using the Internet as communication protocol interfaces and Raspberry Pi as processing unit. This project intends to control the system with the web by either turning device on or off so that the entrance control that system can be controlled through the smart phone. In this project we are planning to make a real time home automation system using Raspberry Pi, Relay module and some home appliances like bulb.

Our home automation system can switch the bulb On/Off or with the help of the smartphone over the Internet with the use of an Android Application which we have designed for our system. When the user changes the state of the appliance via the smartphone application, the message is sent to our server which is our laptop that is connected to the internet. The message is going to the Raspberry Pi which is connected to the server and the Raspberry Pi is changing the state of the appliances according to the command given by the user. Which state to be changed according to which input has been coded. The backend coding has been done in Java language.

2. SYSTEM REQUIREMENTS

Hardware Requirements

Raspberry Pi

It is a credit card-sized and a single board computer manufactured in United Kingdom by the Raspberry Pi Foundation. Raspberry Pi is a small computer which has 1GB LPDDR2, 1.2 GHz processor. It also has 4 USB Ports, 1 LAN port, 1 HDMI port and a display port. Raspberry Pi has inbuilt Bluetooth, Wifi as well which can be used to connect the device to other devices wirelessly. It has 40 GPIO pins which can be used to control various sensors, actuator and electrical appliances.
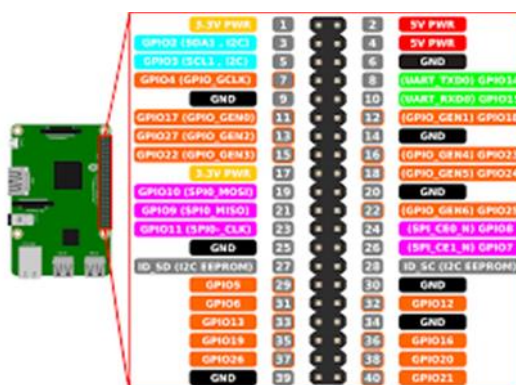

Fig 1.1

Fig 1.2

Relays

Relays are like switches which can be connected to the Raspberry pi and to the appliance we are using. As relay diagrams show, the relay can be in either Normally Open mode (NO) or Normally close mode (NC).When a relay contact is Normally Closed (NC),

there is a closed contact when the relay is not energized and when it is in Normally Open(NO0 mode there will be open contact when the relay is energized. In both the cases, after applying electrical current to the contacts will change their state.

Relays are switches like devices which are used for controlling small voltage when connected to small devices like fan motor, bulbs etc.

LEDs

Light Emitting Devices is used is this project. When you switch on the button for the corresponding LED then it will get turned on. LED is connected to the breadboard to the GPIO pin of the Raspberry Pi and the code is written for the LED to be turned on.

Software Requirements

Android Studio – Android studio is used for the development of the android application for the user's smart device.

Java – Java is used to make a server application for the interface between the android application and Raspberry Pi and to write the Raspberry Pi socket program.

3. FUNCTIONALITY AND DESIGN

Working

The project is IOT based so the use of appliances would be done over the Internet in this project therefore our main goal is to control the appliances over the Internet using a mobile device where an Android application would be installed.

This IOT based project has three main components,

1) Android application

2) JAVA server application

3) Raspberry Pi Java socket program.

Message is sent in the form of an object. Every message has 4 attributes:

1) Message Type

2) Appliance Key

3) Appliance State

4) Raspberry Pi present

Each time a message is sent it has a value assigned to each of these attributes. First both the

Android App and Raspberry Pi register with the server (Android app won't be able to register if the Raspberry Pi is not connected to the server). Once the connection is established the exchange of instructions start. During the exchange, if by any chance the connection is lost, the message won't go through and no changes will be shown in the application.

Hardware Description

The main hardware used for this project are Raspberry Pi, Modem, android phone and the power strip circuit. Raspberry pi is the central part of the whole system and pretty much acts at the core processing and control system. Modem is used to create a LAN, which connects pi and the android phone to a same network. Similarly, android phone is required to run the android application and finally relay module connects the electrical appliances to the Raspberry Pi and controls the voltage of the power supply to the appliance..

Software Description

There are three main parts of software in this project. First is the android application, which is front end, next is the server side software running on the laptop, and a socket program to control GPIO pins of Raspberry Pi at the backend.

Android app is capable of nicely presenting the current status of the home appliances and also control them by simply pushing certain buttons.

4. CONCLUSION

Hence, the basic idea was to create a home automation system which would ease the life of humans and would ask for making less efforts by the human to operate their appliances. Moreover, during the project work we realized ed that it would also reduce the cost of electric boards and would require less energy consumption than usual so it is a successful project which would save money, energy and less human made error.

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