Volume 8 Issue 2 (2020) 152-155 ISSN 2347 - 3258
International Journal of Advance Research and Innovation

Home Automation using Raspberry PI, IoT and ALEXA

K Prasanthi Jasmine, P Bajibi, V Divya, K Ratna Geethica
Department of Electronics and Communication Engineering, Andhra Loyola Institute of Engineering and Technology Vijayawada-520008, Andhra Pradesh, India.

Article Info
Article history:
Received 17 January 2020
Received in revised form
20 May 2020
Accepted 28 May 2020
Available online 15 June 2020

Keywords: Amazon Web Service, Internet of Things.

Abstract: Today, The Internet of Things is the present trending technology. The devices in our home can have the ability to communicate with each other wirelessly. This project presents the low cost home automation system using IoT based Raspberry pi along with Amazon Alexa. This technology uses sensors for passing the data to the Internet. We power our system using Amazon Web Services (AWS), Amazon Alexa. The computing model that is used in the paper is Raspberry pi 3 model B+ which acts as the brain of the system by processing and responding to the user request. A Raspberry pi is used as the hardware component to provide smart features for non-smart homes.

1. Introduction

Presently, Automation assumes a significant job in the worldwide economy and in everyday life. A house is said to be brilliant when it is outfitted with keen technologies.A home automation framework controls lighting, atmosphere, theater setups and appliances.It may likewise incorporate home security, for example, get to control and alert frameworks. Now and again, individuals frequently neglect to switch off their Electrical gadgets when they go out which brings about expanding a gigantic measure of Electricity. So as to beat this problem,the Home Automation idea is presented.

Home automation grants you to control, either remotely, direct or with sensors or with voice.so they switch on or off when you need them and at precisely that point.A brilliant home can be portrayed from various perspectives. There are a significant number of the Home Automation Systems (HAS) that are economically accessible and it very well may be sorted into two principle classes: privately controlled and remotely controlled frameworks . In the principal class, clients can control their home machine utilizing an in-home controller with a stationary or remote correspondence innovation (Bluetooth, Zigbee and GSM) for accomplishing home automation.

In the subsequent classification, clients can remotely control their homes over Internet association utilizing their cell phones or PCs. Home robotization structure should give a straightforward interface to allow game plan, watching and controlling home appliances successfully and capable. Moreover, the automation system should be adequately brisk and trustworthy.

2. Background

2.1. Home Automation Systems

Home automation or Smart Home is a key segment of the Internet of Things, in which everything has an appointed IP address, and can be checked and accessed remotely from anyplace whenever. It is where the home appliances and different gadgets are arranged to control over all parts of a smart home. For a long time, home automation frameworks have been in terms of lighting and straightforward apparatus control.

As of late, innovation is empowering full control of our smart appearances at home from any place for the possibility of the interconnected world to turn into a reality .

Home automation can direct how a gadget ought to respond, why and when it should respond. It brings comfort, complete control and can save money. Moreover, Home automation framework can alert the client to occasons that may happen when they are gone for example, water spills, gas holes, fire and unforeseen access to their home.

At any time, the client can make any changes in the settings of automation framework dependent on his prerequisites and need of utilizing android application or other control gadget.

***Corresponding Author,**
E-mail address: bajibiproduturi999@gmail.com

2.2.Why Smart Home?

One of the advantages of Smart Home is the propelled lighting control framework. The client doesn't need to physically turn on or off the electrical appliances any longer. For instance, when a client enters the room, there are two choices; either the light will automatically on and off after the individual leaves the room, or the client can control the switching from the application utilizing his advanced mobile phone.

The brightness of the light additionally can be controlled with the goal that the power consumed will be decreased.Other than that, the client has the decision to adjust the room conditions dependent on the sensor readings (temperature,dampness, and so forth.) like controlling the speed of the fan from the versatile application or the speed will be consequently balanced depending on the room temperature.In this way,the energy efficiency can be improved on the grounds that when the electrical machines are turned off easily when not utilized, this will spare more energy and decline electrical bill cost.

Also, the client can control the electrical appliances and screen the house conditions from anyplace by utilizing cell phone, tablet or PC. For example, if the client has neglected to switch off the fan and he already showed up at his office, he can turn off utilizing his smart device. The smoke, carbon monoxide and flood sensors additionally can be introduced so that the client will know whether their home is in flood or the air encompassing is risky.

For the security system, if there is any incident happened,the user will receive an alert on their phone. They do not have to worry if there is an intruder trying to sneak into their house since they can monitor from their phone by implementing the motion sensor and if any motion is detected, the alarm will be on. The security system is the most important part to keep our house safe from the intruders. By having a security system installed,we can prevent the burglar from entering the house with the installation of wired surveillance cameras. All the smart home components such as ventilation, heating, air conditioning,centralized lighting system, automated appliances and security system can give comfort in daily lives and also security.

2.3.Limitations of the Existing Home Automation System

In view of the researchers that have been done, one of the principle issues in most existing Home Automation System is their execution and support cost which isn't reasonable for most clients. Moreover, some present frameworks give a perspective on the house from a web application which is a burden for clients, who must access the Web each time they wish to control or on the other hand see the status of their homes.Additionally,a few Home Automation Systems lack easy to use interfaces for checking and controlling machines. In addition, there are a few constraints in the communication technologies that have been utilized in the existing automation frameworks.

For instance, the communication range of Bluetooth is restricted to 10 meters. If the range exceeds 10 meters, the connection will be lost and the client will not be able tocontrol home appliances. Besides, ZigBee is intended for low rate wireless personal area

networks with data rate 250Kb/s which is not sufficient.Anothercommunication technology is Global System for Mobile communications(GSM) in which we can access from anyplace yet it is costly and it has low data rate of transmission and constraints in coverage for rural areas.

Therefore,in this paper,we propose another framework to conquer the restrictions of the current home automation systems.This can be achieved by designing a home automation system using Raspberry Pi,amazon Alexa & with amazon web services(AWS) along with configuration of IOT.This framework is created to control all the electrical machines at home effectively and proficiently.

3. Methodology and Materials

3.1 Conceptual Framework

This segment portrays the theoretical system and the strategy embraced for this work.

3.2 Main components of Home automation system

Raspberry Pi 3 model B+ is used which is installed in the home. All the appliances are attached with Raspberry Pi through the relay. Raspberry Pi is an example of Single Board Computer(SBC). It is easily available in the market. A Single Board Computer(SBC) is a single circuit complete computer which consists OS memory, Input/Output(I/O) and other different components of computers. The Raspberry Pi runs a Python program to communicate with Amazon Alexa.

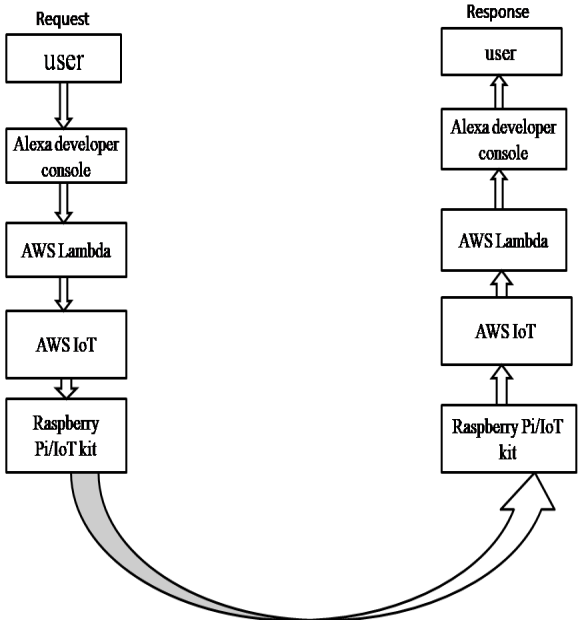

Fig.1: Working flow chart of Proposed Model

Fig.2: Raspberry pi Model B+

Relay is an electrical device which is commonly used to control high voltages utilizing low voltage as an Input. This comprises a loop folded over a post and a two little metal nodes that are utilized to close the circuit. One of the nodes is fixed and the other is movable.Whenever an electricity is passed through the coil, it creates a magnetic field and attracts the moving node towards the static node and the circuit gets completed. So, just by applying small voltage to power up the coil we can actually complete the circuit for the high voltage to travel.

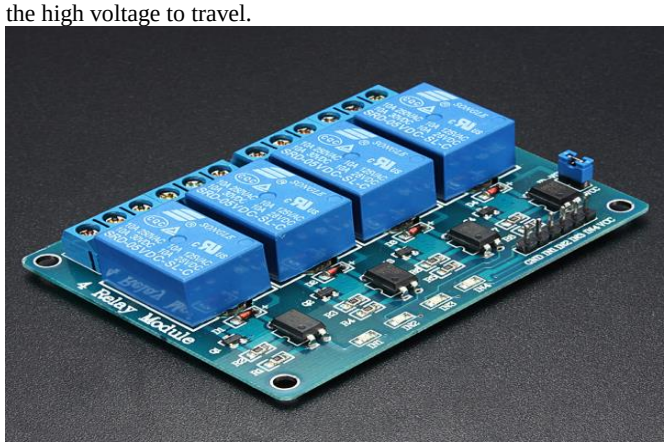

Fig.3: Relay Board

Amazon Web Services(AWS) is a cloud service from Amazon, which provides services that can be used to create and deploy type of Application in the Cloud. These are several services in AWS which are computer, storage database, Network and content delivery, Management tools, Security Identify compliance, Messaging. Amazon Web Services (AWS) is the market chief in IaaS (Infrastructure-as-a-Service) and PaaS (Platform-as-a-Service) for cloud biological systems, which can be joined to make a versatile cloud application without stressing over defers related to framework provisioning (process, stockpiling, and system) and the executives.

4. Proposed system

In the proposed system, the input we give here is voice input from Amazon Alexa. Here the developer console is front end and AWS lambda is backend. Relay acts as interface between devices and Raspberry pi. The voice input is given to developer console. There is two way communication between developer console and AWS lambda. The IoT configuration is done in the cloud itself. The devices that are being connected to the Relay should be given 5V power supply.

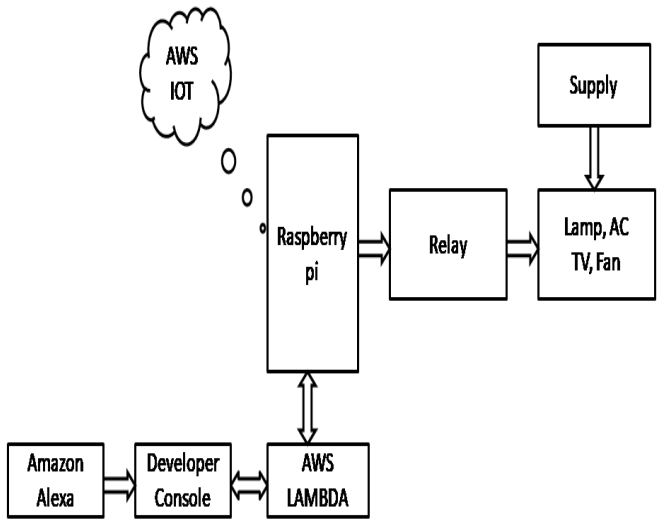

Fig.4: Block Diagram of Proposed System

Fig.5: Project Hardware Setup

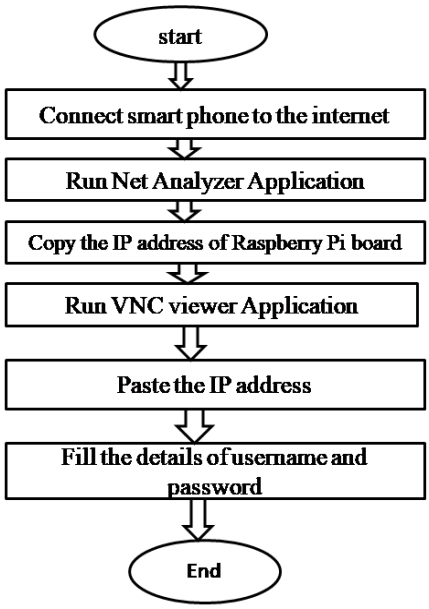

Fig.6: Flow chart of interfacing Raspberry pi to the Front end and Back end

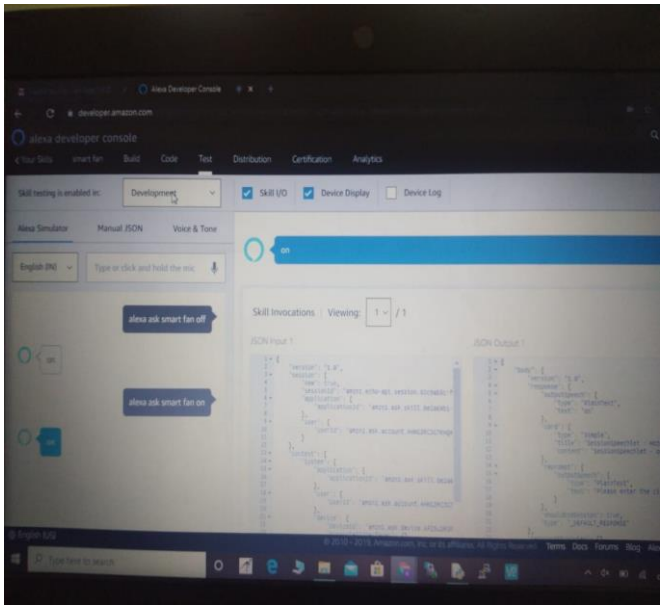

Fig.7: Front end Console

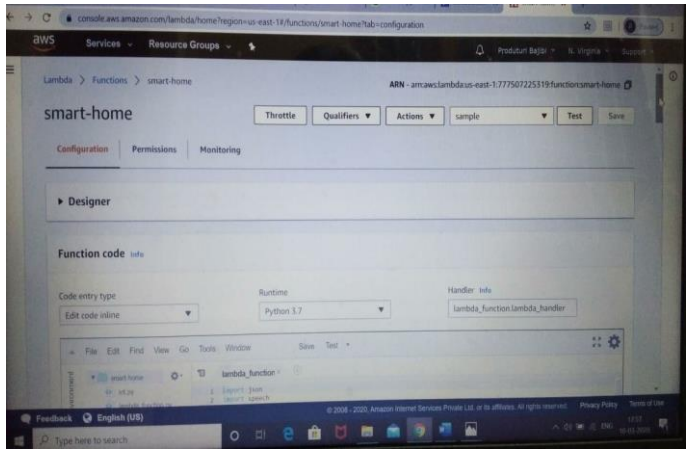

Fig.8: Back end Console

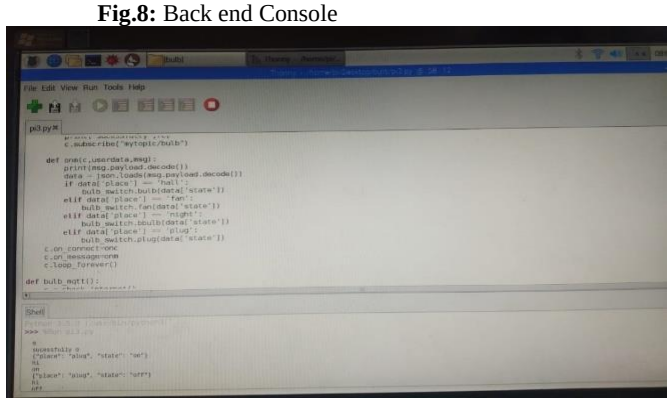

Fig.9: Interfacing of Front end with Back end Console with Hardware component Raspberry Pi model B+

For the interfacing Raspberry pi to the front end and back end, first the smart phone connected to the internet. Then run net analyzer application which is installed in the smart phone. Then copy the IP address of Raspberry pi board and paste it in VNC viewer application. Then the details of user name and password should be filled.

5. Results

This area presents a guide to confirm and approve the usage of the proposed HAS. The fundamental outcomes that we got right now be utilized for additional expansion and upgrade.

Fig10: Output of the Proposed System

6. Conclusion

Home Automation Systems are required in order to utilize the power effectively and in a secured manner. Through Raspberry Pi, multiple appliances can be connected to each other and can be controlled from longer distance too because the connection which is used would be through Internet. Home Automation System is a

Volume 8 Issue 2 (2020) 152-155 ISSN 2347-3258
International Journal of Advance Research and Innovation