

SMART HOME SECURITY SYSTEM USING ALEXA

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Abstract

The development of the IoT has made life cooler in all features. In today's world automated systems are chosen over manual mode. Home automation system have received large consideration with the development of communication skill. The proposed smart home is an IoT based application that uses the internet to control devices easily and also provide home safety with Alexa. User can be able to control the appliances from anywhere through internet. Node Microcontroller Unit is used as Wi-Fi module to connect sensors and update their data. All devices in the system are connected to NodeMCU. In this system user can operate home appliances and the door from anywhere without wasting time to move from office to home. The relay is also used to control appliances. The appliances can be easily controlled over the internet and support home security through autonomous functioning. The system cost is low and consistent automation system that reduces energy consumption and can provide comfort.

Keywords--Alexa, Internet of Things (IoT), Sinric, Relay, NodeMCU.

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INTRODUCTION

Over the past few years, home automation has seen a fast development with the progress and growth of enhanced skills. Due to the improvement of Automation Skill, life is getting cooler in all features. Internet of Things is the latest emerging internet technology [1]. Smart homes severely trust upon IoT devices to monitor the malicious intrusions, leakage of gas, house temperature and some constraints regarding the home and its residents. IoT also helps in data transfer from sensors over wireless network, attaining recognition in computing network [2].

Through this system, appliances such as light, fan, TVetc., are permitted a unique address and connected through a shared gateway. The appliances can be controlled from mobile or any smart devices which can reduce energy consumption. The system provides a easy interface to allow setup and control devices efficiently. The heart of this proposed smart system based on IoT is the NodeMCU(Node Microcontroller Unit)which is used to gather data attained by the sensors and provide to the server. Furthermore, this microcontroller receives commands given by the users over mobile to perform exact responsibilities.

RELATED WORKS

ShradhaSomani et al [3] proposed home security which is realized with motion sensors. If any movement is detected at the entrance of the house, a notification and image of the are sent to user email address by using Simple Mail Transfer Protocol. The user can be able to control the fan, lights and AC etc. A smoke sensor was also used to detect the smoke and aware the user.

Mansour H. Assaf et al [4] proposed automation system in which user can interact with the system through Internet. Home appliances can be controlled using web page. Appliances displayed in a web page that can be controlled over web browser and also monitored in real time. when a threat is detected, the alarm started with the help of motion sensors. User can be notified by text message.

W.A. Jabbar et al[5] proposed Smart Home to control home appliances using application. Arduinois used as Wi-Fi module to control the appliances via internet. PIR sensor is used for motion

detection and buzzer will be ON. The appliances can be controlled through internet and mobile application.

SMART HOME SYSTEM USING ALEXA

A smart home that contains actuators, sensors and controllers to improve safety, comfort for the people [6]. In today's world, smart devices such as smartphones, washing machines, sensors, TV and refrigerators are involved in people day-to-day life. Such smart devices are capable of interacting and communicating to discover a smart environment [7]. Various machineries, music players, air conditioners and fans have been used to prepare home appliances for control [8].

The proposed smart home system uses Amazon echo dot easy access. The Amazon echo dot is also known as Alexa established by Amazon [9]. Home automation is a current skill that transforms home to alevel that can perform different set of tasks repeatedly. The system is used to reduce electricity [10]. Figure 1 shows the proposed smart security system using Alexa. Voice input is given to Alexa device which is connected to AWS (Alexa Web Service). AWS is connected to NodeMCU which is Wi-Fi module and it is used to communicate with home appliances. Appliances like door, light, fan and TV is connected to NodeMCU. User says Alexa, can you please open the door? The command is received by NodeMCU, then it sends the corresponding command to the appliances. Suppose if voice input cannot be used at that time Alexa app is used. Sinric is used to interface between NodeMCU and Amazon Alexa.



Figure 1. Proposed smart security system using Alexa

Alexa Voice Service

Voice controlled smart home is the modern trend after the introduction of Google Home and Amazon Echo. The benefit of using voice in smart home is to decrease the struggle of using smartphone. Mainly users can save the time by using voice instead of text command. People with incapacities also can be able to access this system. Voice commands are captured by Alexa which is qualified by the creators and the user requests "Alexa, open the door" the door gets open. Alexa is the keyword.

Amazon Echo dot

Echo devices connected to the separate associate service which responses to the term Alexa or Echo. Users may change this stir word to "Amazon". User can be anywhere in the room, once user woken up their Echo, he/she can ask any question such as time, weather, news, traffic, sports scores, restaurant details and lots of other information. User just has to learn and use the accepted commands. User's Echo will also send text information to the Alexa app in their phone or tablet. The Amazon Echo Dot looks more like a hockey puck than the echo of the original cylinder, which is 3 inches in diameter and nearly 1.5 inches tall. It has a few buttons above it that control the volume, disable the speaker, and raise the device to ask a question or command.

Creating Amazon Account

Before begin using Echo Dot link it to a Wi-Fi network and register into an Alexa app. For new user create an account in amazon Alexa app, signup with name and mobile number. After providing mobile number amazon Alexa send OTP. For existing user sign in with user name and password on iPhone or Android device.

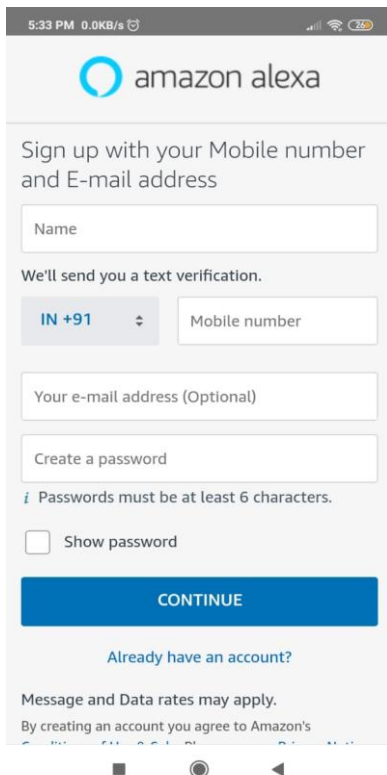


Figure 2. Amazon Alexa App for new user

Connecting Alexa with Internet

Step 1: Download the Alexa app from app store. After Downloading the Alexa app tap the "Devices" icon in the bottom-right. After tapping the devices user want to add device, for that click "+" symbol on top right.

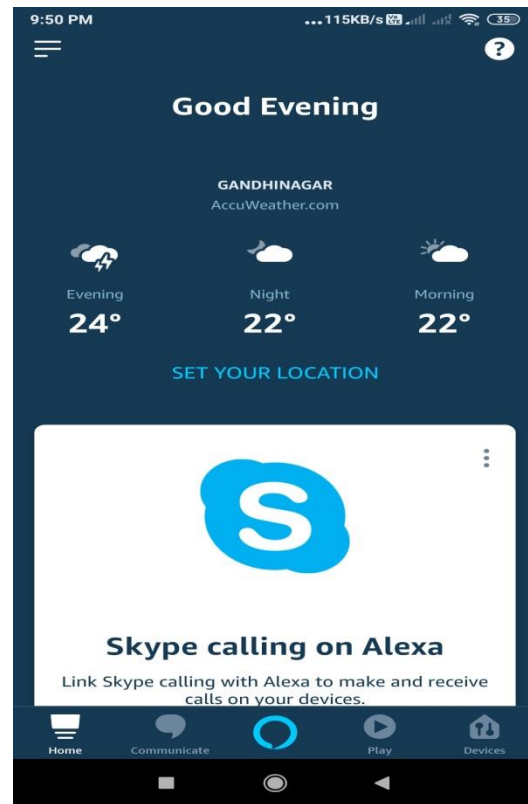


Figure 3. Alexa app home page

Step 2: By this time user have to power ON Alexa on the wall socket. Blue light will circle which shows that Alexa is trying to connect to a network.



Figure 4. Power ON Alexa

Step 3: On Echo device, press and hold the Action button for five seconds. The light ring switches to orange, and the user mobile device connects to the Echo device. This time Alexa will respond that it's in setup mode. Click on Amazon echo icon followed by the echo dot icon that appears on the next screen. Minimize the Alexa app and go to Wi-Fi settings in mobile. A list of available Wi-Fi networks appears. Choose a network that starts with Alexa. After providing network password wait for Alexa to connect. Again, back to Wi-Fi settings and choose old network. Now mobile and Alexa are connected to the network and Alexa is ready to use. User can now use Echo device. To begin, say "wake up word" and then speak with Alexa naturally.

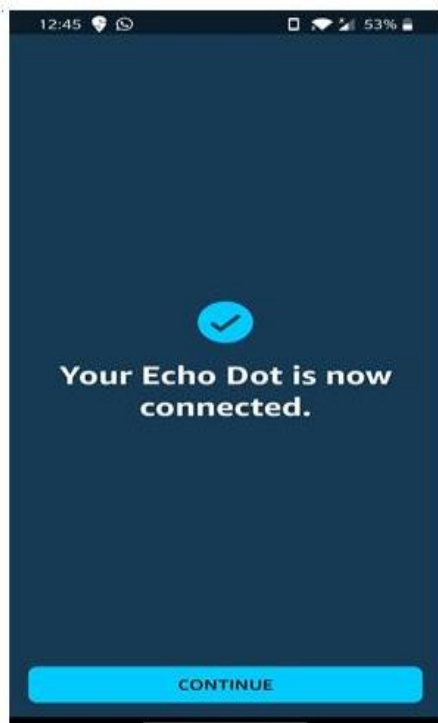


Figure 5. Echo Dot is Connected

Microprocessor Unit NodeMCU ESP8266

NodeMCU is an open-source IoT platform, it contains firmware which runs on the ESP8266 Wi-Fi system on chip. ESP8266 is chosen because of low-cost compared to other and also it makes an perfect package for IoT applications. ESP8266 chip equipped with the 32-bit Reduced Instruction Package System microprocessor at an adjustable clock frequency of 80 to 160 MHz and supports Real Time Operating System [11].

Power requirement

The voltage range for ESP8266 is 3V to 3.6V, the board comes with a low-dropout voltage regulator to keep the voltage steady at 3.3V. It can supply upto 600mA, which can be enough during Radio frequency transmissions. ESP8266 NodeMCU is powered supplied via the MicroB Universal Serial Bus connector.

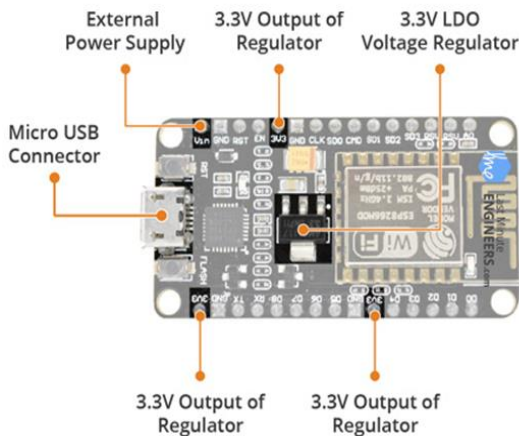


Figure 6. Power Requirements of NodeMCU

Relay

A relay is an electrically functioned switch. to operate relay a suitable pull-in and hold-in current should be passed over its coil. The voltage for relay is 5V or 12V. When a LOW signal is applied

thus turning ON the relay. When HIGH signal is applied relay is turning OFF.

Sinric

Sinric is an open-source software which helps us to integrate existing devices with Amazon Alexa or Google Home for FREE. To use the service, the user must create a free account or with an existing Gmail account, sinric services can be accessed through the special API keys which are provided during account setup.

Working

Sinric is used to interface NodeMCU and Amazon Alexa. At first user have to create an account in sinric in order to make development board to communicate with Alexa. Once the account is created, user have to login into the console, then click on the smart home device add button to create a new smart home device.



Figure 7. Sinric linked with echo

HARDWARE IMPLEMENTATION AND RESULTS

Step 1

Switch on Alexa and connect it to a network. Place your echo point in the center(at least eight inches from any walls and windows). The light ring in the echo dot will turn blue and the orange.



Figure 8. Alexa is connecting to Network

Step 2

Switch ON the fan and light. After the setup is complete, there are two ways to control the lights. The user can say Alexa, turn ON the light and fan or open the app, find the light and fan in the Devices tab and tap the light and fan to turn it ON. The user can also control the specific lighting rooms by saying "Alexa, turn ON the living room" or "Alexa, turn ON the desktop light."



Figure 9. The Fan and Light get ON



Figure 10. The Light and Fan get OFF

When there is no need of fan and light user can switch OFF both the appliances by saying "Alexa turn OFF light and fan or open the alexa app find the light and fan in the list on the devices tab, then tap a light and fan to turn it OFF.

Step 3

When user says "Alexa, lock the front door". The door gets closed. If user says "Alexa unlock door", the door gets open.



Figure 11. The door gets open

CONCLUSION

Smart home is needed because human can forget to turn OFF the devices. The purpose is to control some key home devices by voice. Home automation system is an important step towards increasing technological advancement in the equipment industry, and is another way to avoid human error and reduce energy consumption. Using Alexa is also useful for controlling home appliances. It controls all the appliances at home. It not only aims to provide a healthy and comfortable lifestyle to the users, but also helps the sick or disabled and living alone elderly people so that they can easily handle their tasks. This system is more flexible and user friendly.

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