Design and Implementation of Smart Home using Cisco Packet Tracer

[1] Aastha Saini, [2]Anushka Rai , [3]Kumari Ankita , [4]Ruchi Tripathi
[1][2][3][4] Galgotias College of Engineering and Technology,India
[1] 381aastha@gmail.com ,[2]anushkarai0018@gmail.com, [3]ankita001kumari@gmail.com ,
[4]ruchi.tripathi@galgotiacollege.edu

Abstract: We have made a smart home in which the currently released IOT technology is used to automate different activities of home. And these activities can be done without the involvement of users. The previous software has only networking devices, but we have used here the latest version of the software (Cisco packet tracer version 7.2) . This helps people to manage the home appliances and build an absolute environment in home. IOE devices connected through the internet to control and monitor the home devices such as cooling, alarming, heating. When the devices are computerized, they can be used to control the activities functioning in a smart home. The devices used to provide a variety of network components that consider a real network, and then apply and configure the devices to design a real network. The aim of this research is to come up with the simulation of appliances that can control and configure IOE devices with classically networking device, and process data at the back end.

Index Terms— Internet of things, Home Gateway, Server, RFID Reader, Packet tracer simulator

I. INTRODUCTION

In this era, technology has become and indivisible part of our lives. We've seen the growth of technology in almost every field, therefore the need to make our homes smart arises. The Smart home is a convenient home setup that uses IOT (Internet of Things) technology to automate different activities of home using sensors, actuators, and smart devices, therefore reducing user's involvement in monitoring their home system it promises the potential users a range of benefits from comfort to improved security, to the more sustainable use of energy and resources it proves to be a powerful tool for differently-abled people and the elderly [2].

The smart home comprises sensors and actuators that can monitor and manipulate the home environment such as (Humidity, Smoke, Temperature, Wind, and Sound) [1]. It also enhances security by using a siren, LCD, sending email to the legitimate user if any activity is detected while they are away from activity is detected while they are away from crucial times [3]. Smart lighting helps you use energy efficiently by automatically switching off or dimming the

lights when no one is there in one part of the home. It can also help you avoid leaving the garage lights on overnight or the running air conditioner when no one is home. Motion detection, webcam monitoring helps you in keeping an eye on kids and the elderly. In smart home

devices are interconnected with each other, are all part of IOT network of web and things, where all of them can gather and share information and can be accessed remotely from anywhere through a laptop, smart phone or tablet. The devices come with self-learning skills so they can learn the schedule of homeowners and make the needed adjustment.

IOT is a giant network with connected devices, these devices gather and share data about how they are used and the environment in which they are operated it is all done using sensors that are embedded in every physical device it can be mobile phones, vehicles, electrical appliances, barcodes, traffic lights and almost everything you come across in your day to day life these devices continuously share data, data emitted by these sensors is sent to IOT platform where it integrates the data and further analytics is performed on it and all the important data is extracted, it is then shared with other device for better user experience and automation. IOT has a wide range of applications in this paper we will be focusing primarily on Smart Home. In this paper, we will be designing and implementing Smart Home on newly released Cisco Packet Tracer version 7.2 and configure Internet of everything device with classically working networking devices in order to control all these home gateway is used. It also helps us to manipulate environmental factors and observe the effects on sensors and actuators, configure

basic settings including IP addressing.

Fig 1 Smart Home with IOT

II. METHODOLOGY

The implementation of a smart home using a newly released Cisco packet tracer includes smart devices such as smart fan, door, window, fire sprinkler, lawn sprinkler, and different types of sensors. Home Gateway and MCU-PT (Microcontrollers) monitor these smart devices and sensors, microcontrollers also connect the registered smart devices to Home Gateway and provide an environment for controlling and programming the IOE devices connected to it respectively.

A. Home Gateway

Smart devices are capable to connect through wired and wireless networks. The home gateway is connected via an Ethernet port and to verify the wireless link, we also can configure the home gateway with WEP/WPA-PSK /WPA2 protocols. figure 2 shows seventeen IOT devices connected to Home Gateway through the wireless connection. The IP address of Home Gateway is 192.168.25.1 but can also be accessed through its Internet-facing IP address. It also acts as a DHCP server, by allotting each device an IP address. IOE devices are operated through a web interface by Home Gateway.
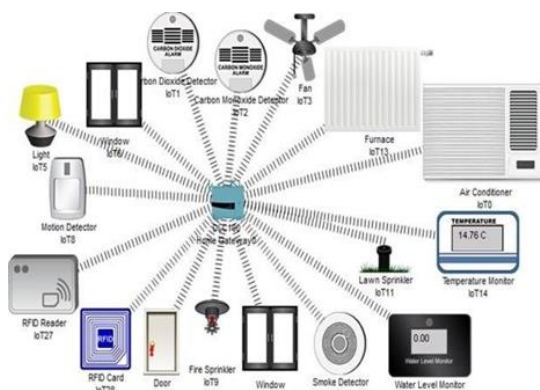

Fig 2(a) IOE devices connected to Home Gateway

Fig 2(a) shows the Home Gateway connected to smart devices using a wireless medium. The home gateway assigns an IP address to all the devices connected through it, hence acts as a DHCP server.

B. MCU-PT(Microcontroller)board

It connects different smart devices internally and provides programming with languages such as JavaScript or Python to monitor smart devices.
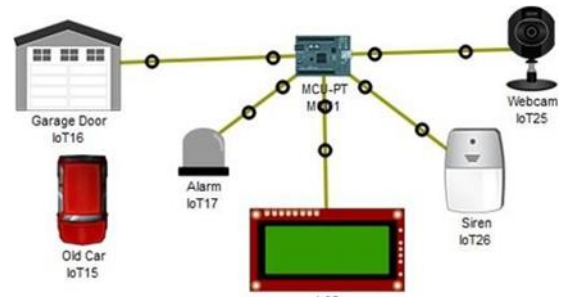

Fig 2(b) IOE devices connected to MCU board

Fig 2(b) IOE devices connected to MCU board Fig 2(b) shows a microcontroller unit connected to a web-cam, alarm, siren, LCD alarming the home owner in case motion is detected by providing by proving sound, red light, and text message.

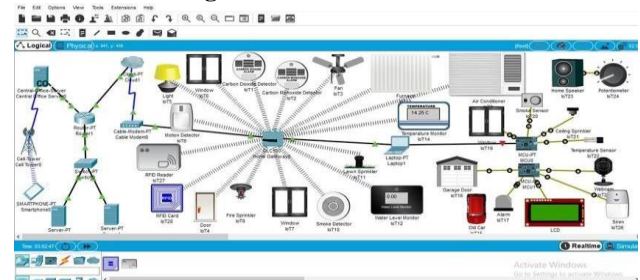## III. IMPLEMENTATION

A. Software Design

Fig 3.1(a) Smart Home Architecture

For implementing the smart home using Cisco Packet Tracer we've used Server-PT, Switch, Laptop, MCU-PT, sensors, detector, IOT server, cell tower, Central office server, DNS server, modem.

Fig 3.1(a) shows the Smart Home is built using multiple smart devices, home gateway, DNS server, IOT cloud, cell tower, central office server. The Home gateway registers and connects all the smart devices and provides remote access to them.

Fig 3.1(b) Conditions to control IOE devices

B. Security Issues

When a microcontroller detects motion it will process its work. But sometimes it creates problems when any unwanted people such as a robber or any other person enter the room then it hampers our actual action. So, we need to trace people living in the home. For that, we use RFID readers to identify people by scanning RFID tags. RFID (Radio Frequency Identification) recognizes locations and identification of tagged items to collect data that automatically identifies objects through low power radio waves. It contains an integrated circuit and antenna for data transmission to the RFID reader. The Reader then converts radio waves to accessible data formats. There are two kinds of RFID tags: Passive and active RFID tag.

This mode helped to physically visualize and troubleshoot any kind of network, for example setting up pings or more complex packages between nodes.
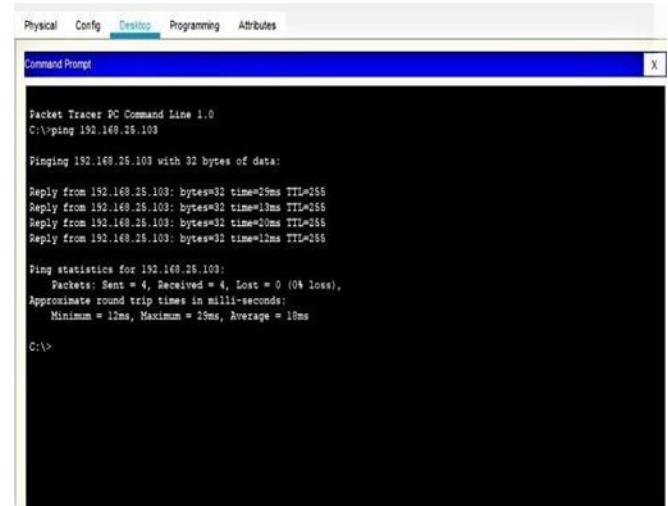

Fig 4(f) Packet transfer from laptop to door through home gateway

CONCLUSION

In this paper we've used cisco packet tracer version 7.2 for implementation of our smart home network, This version provides us several IoE device which can be used for automating home. We've used home gateway is used to register and record smart devices for monitoring also provides IP addressing to devices connected to it and Microcontrollers(MCU-PT) are used to interconnect various sensors with smart devices MCU also gives us the option to manage devices by programming them using

python or JavaScript.

REFERENCES

[1] Chattoraj, Subhankar. "Smart Home Automation based on different sensors and Arduino as the mastercontroller." International Journal of Scientific and Research Publications5.10 (2015): 1-4

[2] S. Raja Gopal, P. Saleem Akram , S. Sriram, T. Pavan Koushik, V. Mohana Krishna, ―Design and Analysis of Heterogeneous Hybrid topology for VLAN configuration―, International Journal of Emerging Trends in Engineering Research, Vol 7, No 11, PP 487 – 491, 2019

[3] Soliman, Moataz, et al. "Smart home: Integrating internet of things with web services and cloud computing." Cloud Computing Technology and Science (CloudCom), 2013 IEEE 5th International Conference on. Vol. 2. IEEE, 2013

[4] Rajeev. P. (2013). Internet of Things: Ubiquitous Home Control and Moni112toring System using Android based Smart Phone. International Journal of Internet of Things 2013,\, 2(1), pp.5-11

[5] S. Haller S. Karnouskos and C. Schroth "The Internet of Things in an Enterprise Context " in Future Internet-FIS International Journal of Engineering Science Invention Research & Development; Vol. IV, Issue VII, JANUARY 2018 Lecture Notes in Computer Science Vol. 5468 2009pp 14-28.

[6] Jie, Yin, et al. "Smart home system based on iot technologies." Computational and Information Sciences (ICCIS), 2013 Fifth International Conference on. IEEE, 2013.

[7] Aggarwal, R., & Lal Das, M. (2012). RFID Security in the Context of Internet of Things. page 51-56. Kerala: First International Conference on Security of Internet of Things

[8] Sun, Liangxu, et al. "Comparison between physical devices and simulator software for Cisco network technology teaching." Computer Science & Education (ICCSE), 2013 8th International Conference on. IEEE, 2013.

[9] The Internet of Things in an Enterprise Context " in Future Internet-FIS 2008 Lecture Notes in Computer Science Vol. 5468 2009

[10] Smart home system based on iot technologies." Computational and Information Sciences (ICCIS), 2013 Fifth International Conference on. IEEE