

Home automation and fire safety system using cisco packet tracker

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Abstract: Smart home is a house that uses currently released Internet of Things technology to automate different activities of home. Internet of Everything devices connected to the internet, to allow the distant monitoring and controlling of different home appliances such as lighting, heating, cooling and alarming. Fire identifiers are utilized to recognize the fire or smoke at a beginning time and can help in sparing lives. Right now, Internet of Things based alarm has been planned utilizing and smoke sensor. On implementing smart home and fire safety using new released Cisco packet tracer simulation software, since different Internet of Things device used for home automation is included in this new version simulator. The previous software has only networking device, but in new released simulator Internet of Things device is included those are sensor, board, Internet of Everything device and Programming Languages with classically networking device. To design smart home we used different device used for home security, safety and home environment prosperity.

I INTRODUCTION

Smart home is a house that uses currently released IOT technology to automate different activities of home. IOE devices connected to the internet, to allow the distant monitoring and controlling of different home appliances such as lighting, heating, cooling and alarming. We implemented smart home using new released Cisco packet tracer simulation software, since different IOT device used for home automation is included in this new version simulator.

The previous software has only networking device, but in new released simulator IOT device is included those are sensor, board, IOE device and Programming Languages with classically networking device. To design smart home we used different device used for home security, safety and home environment prosperity.

In our project all smart appliance is registered to home gateway and controlled by legitimate person. Smart Home reduces user's involvement in monitoring home settings and controlling home appliances by including different sensor in home automation. If smoke is detected the fire sprinkler automatically on to ventilate the environment and window is open. Smart home is

implemented using different smart object used for home automation such as smart fan, smart window, smart door, smart light, smart coffee maker, smart AC, fire sprinkler, fire sprinkler and different sensor is included.

The scope for the home automation systems involves making homes even smarter. Homes can be interfaced with sensors including motion sensors, light sensors and temperature sensors and provide automated toggling of devices based on conditions.

The aim is to create a home automation system that performs user's involvement functions like controlling the electrical appliances that it is connected to home gateway.

II METHODOLOGY

Cisco Packet Tracer

Cisco packet tracer is a powerful virtual network simulation tool used to learn and understand different concept in computer networks. The tool is developed by Cisco in order to allow students or user to get practical networking technology knowledge. Cisco packet tracer provide user/ student to design and simulate a network by using virtual devices such as hub, router, switches etc. In Cisco packet tracer, the

simulation works without having any physical network.

The system implemented using Cisco Packet Tracer 8.1. Packet Tracer is a cross-platform visual simulation tool designed by Cisco Systems that allows users to create network topologies and imitate modern computer networks. The software allows users to simulate the configuration of Cisco routers and switches using a simulated command line interface. Packet Tracer makes use of a drag and drop user interface, allowing users to add and remove simulated network devices as they see fit.

Cisco Packet Tracer 8.1

Cisco Packet Tracer 8.1 features the new Packet Tracer Tutored Activities (PTTA), a new type of activity that provides hints to the learner along the way if they want them. Packet Tracer Tutored Activities (PTTA) is designed to provide a more personalized and equitable learning experience. In addition, Cisco Packet Tracer

8.1 includes some bug fixing and improvements on accessibility, usability, and security. Cisco Packet Tracer 8.1 is built upon Packet Tracer 8.1. Version 8.1 was a major release, featuring two exciting new updates.

The Enhanced Physical Mode brings you into the virtual lab for a realistic experience of cabling devices on the rack. Reinforce critical skills such as device placement (Rack & Stack), switching on device power, device port-to-port cabling (including cable choice and management), troubleshooting, and more.

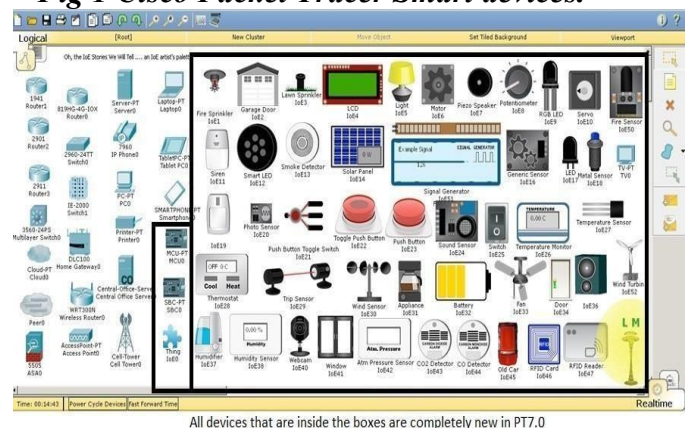
A Network Controller, similar to existing real-world SDN Controllers like Cisco DNA Center and APIC-EM. You can practice a centralized network management approach using the Network Controller model. The Network Controller managed using its Web GUI or using its APIs, gives you a centralized dashboard to view the network's state, quickly identify & troubleshoot issues, and push configuration changes to all managed devices at

once. Plus, you can access the Network Controller from real-world applications running on your computer, like a browser, Python, or Postman, to execute your own infrastructure automation scripts.

Cisco packet tracer and Internet of Things

The last version of Cisco packet tracer included some new feature that can help us to perform internet of things simulation. Those new feature are smart devices, sensor, actuator and microcontroller. Some of those smart devices included in packet tracer are smart windows, smart fan, smart light, alarm siren. We can also find some sensors such as water level, temperature, humidity, carbon dioxide. The internet of things devices in the Cisco Packet tracer can be used to build and simulate different internet of things application such as smart home, smart industry, smart city etc. The benefit of using Cisco packet tracer is that, user can interact with the devices the same way they do in the real devices. In addition, with it multiuser functionality, multiuser can work together to build virtual network through a real network. The Figure 1 bellow show some different devices include in the new version of Cisco packet tracer.

Fig 1 Cisco Packet Tracer Smart devices.



Home Gateway

Home Gateway have 4 Ethernet ports in addition to a wireless access point configured with the "Home Gateway" SSID. To secure wireless connection WEP/ WPA-PSK/ WPA2 enterprise can be configured on home gateway. The Figure 2 shows

seven internet of Things device connected to a Home Gateway by using Ethernet cable and wireless. To connect the Home Gateway to the Internet its Internet WAN Ethernet port available on home gateway. The IoE device can be remotely managed through a web interface hosted by the Home Gateway. The Home Gateway internal (LAN) IP address is 192.168.25.1 but it can also be accessed through its Internet facing IP address.

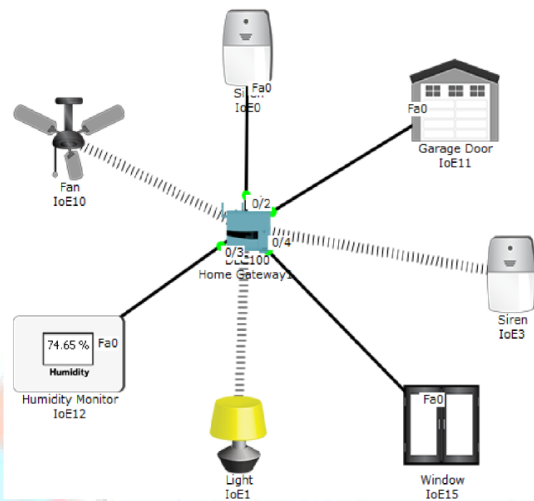


Fig 2 Home gateway with seven smart things connected to Home gateway.

Smart home

Smart home is a home equipped with different smart objects such smart fan, smart light, coffee maker, smart windows that can be remotely controlled via a smart phone or computer through internet connection. Smart home offer the homeowners convenience, savings, safety, and comfort. Saving because the use of some smart objects such as smart thermostats and smart light can help for energy saving (reduce energy consumption) and reduce bills. It is convenience because every task are done automatically, and safety is one of biggest benefits of a smart home, because you can remotely control the devices and see if there is a danger at any time in your home.

Comfort because of the possibility it offer, imagine

that you have the possibility to turn on your air conditioner to cool down the place before you reach your home, and also the possibly to check if there are foods in your refrigerator, or even to check if some foods inside your refrigerator are expiring or finishing. Smart home allows homeowner to manage all the home devices anywhere at any time.

III IMPLEMENTATION

Smart home implementation

The implementation of the smart home is done with the new version of packet tracer, precisely Packet Tracer 8.1.1.

Fig 3 Smart home Application



Algorithm

The Algorithm is explained as follows

- Step 1: Start the project.
- Step 2: Open the pkt file and save the file.
- Step 3: Add the required components to the workspace
- Step 4: Connect all devices in workspace using wireless connection.
- Step 5: Configure the devices and setup internet service provider router.
- Step 6: Add Home Gateway to the Network.
- Step 7: Connect smart Devices to the Wireless Network.
- Step 8: Add End User Device to the Network.
- Step 9: Stop.

Devices configuration

To implement smart home using Cisco packet tracer we used different sensor, smart device and detector to make smarter. The following figure represents the home architecture that connected each other using

wireless and wired medium. To implement smart home using Cisco packet tracer we used different sensor, smart device and detector to make smarter. The following figure represents the home architecture that connected each other using wireless and wired medium.

The home Gateway has default username and password to access the registered IOE device, as shown in Figure 4.

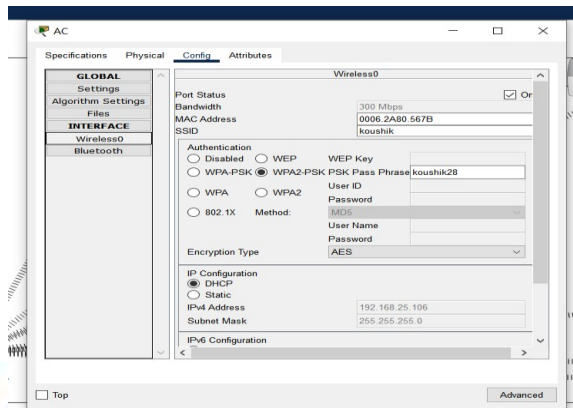
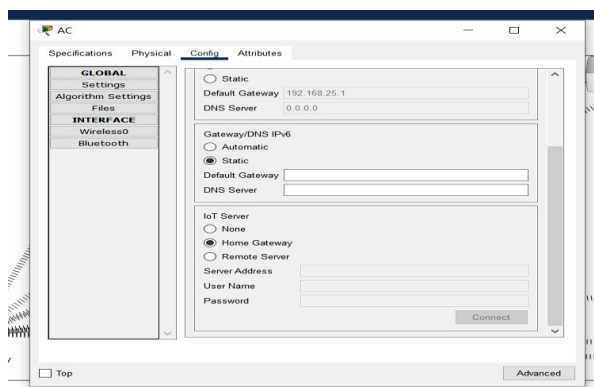


Fig 4 Smart Air conditioner configuration SSID and password

In order to connect the devices to the home gateway, we must select wireless since the devices will be connected using wireless connection, then we specify the SSID of the home gateway in the devices. The Figure 5 is the smart Air conditioner configuration to the home gateway.

Fig 5 Smart Air conditioner Connected to the Home Gateway



The authentication is disabled to just to keep the configuration simple. So we repeated this configuration in all the devices.

Smartphone is used to remotely access the smart object through a web interface using the URL 192.168.25.1 with an internet connection shows how to register IOE device to home Gateway.

While all the devices have been configured, they can all be accessed through a web browser of the smart phone with the URL 192.168.25.1 using the correct user name and password, as shown in Figure 6.

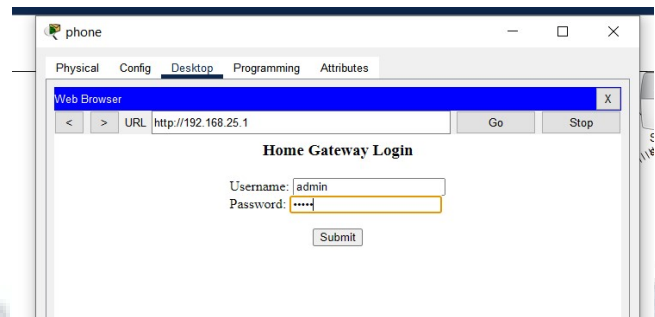


Fig 6 Registration Server login.

Device used for design

The Table 1 below shows the lists of the different devices used for the simulation and their function.

Table 1 Device used for implementation

No	Devices	Function
1	Home gateway	Used for smart devices registration.
2	IoT server	Used to control smart devices registered on it.
3	Smart phone	Used to remotely access smart devices.
4	Fan	Used to ventilate home environment based on some Condition.
5	camera	Used to control activities at home.
6	Smart light	Used give light for home.

7	Smart door	Provide Function basedevent in order to open and close the door from distance.
8	Smart windows	Used to control the window remotely Affects Argon,Carbon Monoxide, Carbon Dioxide, Smoke, etc.,
9	Smart siren	Used to make sound for some event in theHome.
10	Motion detector	Used to Connect home getaway and provide Detection of motion.
11	Air conditioner	Used for home cooling.
12	Fire sprinkler	Used the sprinkler to water on fire.
13	Coffee maker	Used to control the coffee machine.
14	Smoke detector	Used to sense the smoke level.
15	Old car	Used to simulate different scenario in home design since it affect, co, co2 and smoke level.

Home gateway used for assigning IP address registration. In the Figure 5.2 above, we to the smart devices and for smart devices can see different smart objects connected to the home gateway using wireless connection. There are four Ethernet ports in the home gateway plus a wireless access point with the SSID “home gateway”. We can configure WEP / WPA-PSK/ WPA2 protocols in the home gateway for the wireless connection authentication.

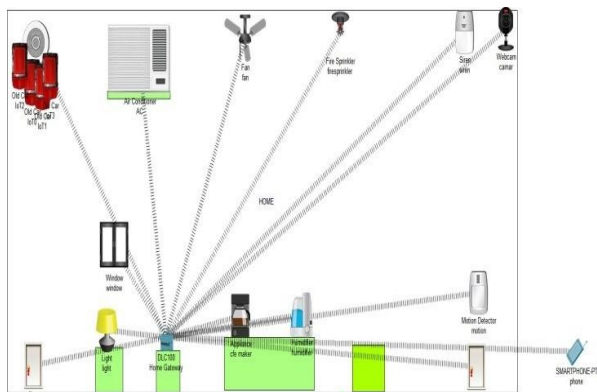


Fig 7 Smart home architecture

After being connected to the IoT homepage through browser and successfully passing the authentication, the user can then see the list of the connected devices and perform the action we want. The Figure 8 shows the registered IOE device on home Gateway.

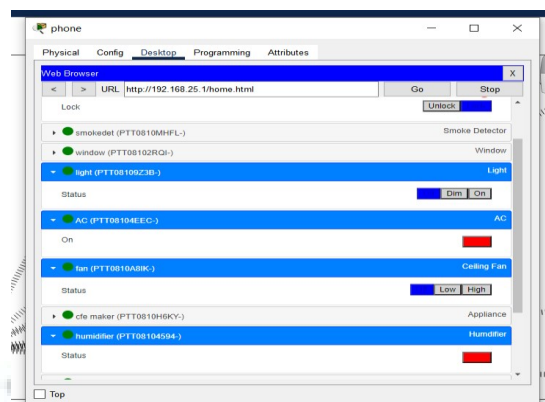


Fig 8 IOT Devices Status

The below Figure 9 shown the condition made on home gateway to control IOE device

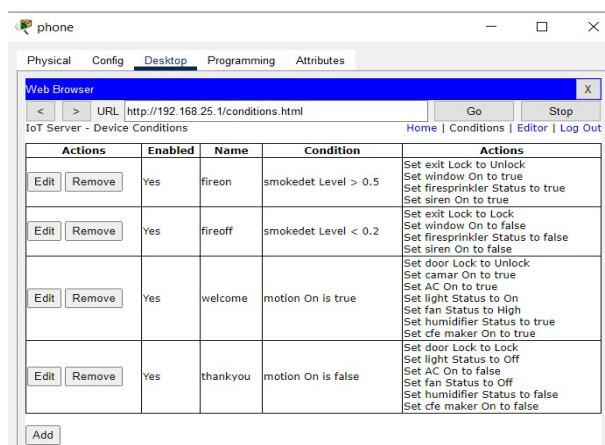


Fig 9 condition made on home Gateway to control IOE device.

IV RESULTS

When the person's motion is detected by motion detector, based on the condition made on home Gateway IOE devices such as webcam, AC, fan, light, door, coffee maker, humidifier are activated, as shown in Figure 10 and IOE devices remain ideal when no motion is detected.

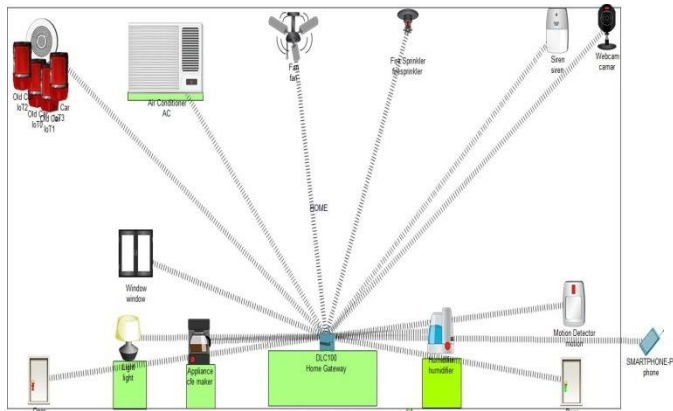


Fig 10 Home appliance is on when person's motion is detected.

The Figure 11 shows the fire sprinkler and siren are on, window and exit door are opened this is based on the condition made on home Gateway that is if smoke level is more than 0.5 the fire sprinkler try to turn off the cause of smoke, exit door and window is open to ventilate the place. To simulate the scenario we used old car as old car increases the smoke level.

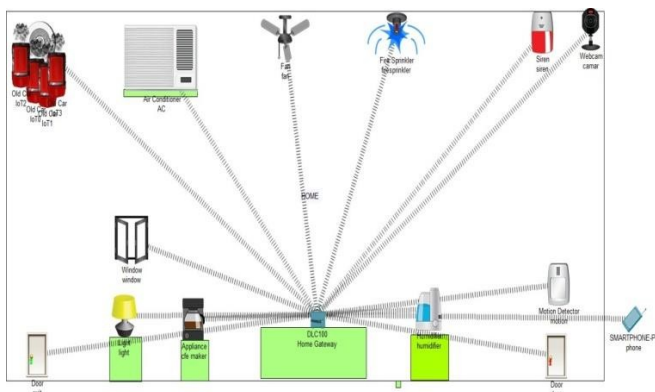


Fig 11 Home safety is on when smoke is detected.

V CONCLUSION

Our internship work was to simulate the internet of things using a Cisco packet tracer a virtual practical tool this included many smart devices used for smart home where we can learn and understand this technology. Internet of Things is a new revolutionary and advanced technology. The ideas was to implement and simulate a very famous internet of things application that is the smart home using Cisco packet tracer.

The home gateway is used in order to connect different smart devices on it and IP address distribution to those smart devices via wireless network. The IoT server and the smart phone play a very important role in the simulation because, they permit to remotely control the IoT devices via internet. The IoT server is used for smart devices registration while the smart phone is used remotely access the smart devices registered on the IoT server. The utilizing of various internet of things devices and network devices included in Cisco packet tracer made the simulation easy.

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