# PROJECT TITLE: Wi-Fi based home automation system

A PROJECT REPORT

Submitted by

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Under the guidance of

**Dr. R. YAMINI**

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*In partial fulfilment* of the requirements for the degree of

**BACHELOR OF TECHNOLOGY**

**In**

**COMPUTER SCIENCE AND ENGINEERING**


**DEPARTMENT OF COMPUTING TECHNOLOGIES**

**COLLEGE OF ENGINEERING AND TECHNOLOGY**

**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**

**KATTANKULATHUR - 603203**
**NOV. 2023**


# SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

## KATTANKULATHUR - 603203

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Certified that **18CSC302J** project report titled **"Wi-Fi based home automation system"** is the bonafide work of **Akula Lakshmi Nikitha [RA2111003011810], Tanuja Kharol [RA2111003011808] Dola Mani Jagan [ RA2111003011820], Naga Sindhu [RA2111003011836] , Anisha Kumari [RA2111003011837 ] and Venkata Burla Krishna [RA2111003011841]** who carried out the project work under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion for this or any other candidate.

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## SRM Institute of Science and Technology

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Degree/ Course : B.Tech in Computer Science and Engineering

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# ABSTRACT

The rapid advancement of technology has given rise to innovative solutions for enhancing the convenience and efficiency of modern living. One such development is the integration of WiFi technology into home automation systems, creating a seamless and interconnected environment that allows homeowners to remotely control and monitor various devices and appliances. This paper presents an overview of a WiFi-based home automation system designed to streamline daily tasks and provide a higher level of comfort and security.

The proposed system leverages the ubiquity of WiFi networks in residential settings to connect and control a wide range of smart devices, including lighting, heating and cooling systems, security cameras, door locks, and entertainment equipment. Users can access and control these devices through a centralized mobile application or a web interface, enabling remote management from anywhere with an internet connection. Key features of this WiFi home automation system include real-time monitoring, scheduling, and automation of devices to optimize energy consumption and enhance security. Users can receive notifications and alerts, ensuring that they are always aware of the status of their smart home. Additionally, the system is designed with a strong emphasis on user-friendliness, ensuring that homeowners of all technical backgrounds can easily set up and customize their smart home to suit their preferences. The integration of WiFi technology not only enhances the convenience of home automation but also contributes to energy conservation and cost savings. By efficiently managing and controlling various devices, users can reduce energy consumption and environmental impact while enjoying a more comfortable and secure living space. This paper provides an in-depth examination of the components, architecture, and benefits of this WiFi home automation system

# CHAPTER 1

# INTRODUCTION

In today's technologically growing world technological development without becoming a requirement that is frequently used in today's human life. Living home that includes smart objects with specific functions is called smart home. i.e aimed to improve safety, comfort and efficiency .which can be used to automate home activities without users using various sensors (Temperature, Humidity, Smoke, Wind, Sound) to monitor the home environment. And there are usually monitoring tools, and the devices that are controllable and automatic this can be accessed via an internet-connected computer or smart mobile device. Instead of providing security that is safe, smart home can provide different features to provide automatic security using various alarm systems, as LCD display and siren sound and by sending email to valid users if sensor detects security issues . Home automation states handling and monitoring home items using microcontroller or computer technology. Automation is common because it makes the process simple , productive and secure. All smart devices are registered at the home gateway in this paper and operated by a legitimate person . By including different sensors in home automation, Smart Home eliminates user engagement in tracking home settings and operating home appliances. IOT (Internet of Things) is a system in which people, objects with a specific identity and moving capacity information without needing a dual human-to-human origin , i.e. destination or contact betweenpeople and computers IoT and IoE are a well versed technology which optimizes the life based on smart sensors and smart devices which operate together on the internet. All(IoE) web is a theory that extends machine-tomachine communication (M2M) emphasis of the Internet of Things (IoT) to describe a more complex system that also includes people and processes. IoE is a smart people, method, information and stuff relation. The Internet of All (IoE) describes a system inwhich billions of entities have sensors for measuring and determining their status; all linked by common or proprietary protocols over public or private networks. This paper describes the implementation of smart home with the use of latest version of cisco packet tracer as this version includes different sensors, actuators and smart devices used for home automation . Chic lights, chic windows, chic fans, chic doors with different detectors and sensors are some of the devices . Latest version the simulation program for cisco packet tracer odeling and configuration ofIOE systems with conventional networking system to implement smart home.

# CHAPTER 2

# REQUIREMENT ANAYLYSIS

Requirement analysis for a WiFi home automation system is a critical step in designing and implementing an efficient and user-friendly smart home solution. Understanding the specific needs and expectations of the users is essential. Here is a breakdown of the requirement analysis process for a WiFi home automation system

## 2.1. REQUIREMENT SPECIFICATION

Server

Router WRT-300N

Switch

Laptop

IOT Smart Fan,

window

Air Conditioner

Siren Web

Cam

Motion Sensor

Smoke Detector

Humiture Monitor

Lawn Sprinkler

## 2.2. SOFTWARE REQUIREMENT

Operating System: Windows

Platform: Cisco Packet Tracer

Back end: IOT Server

Languages: HTML, JAVA, JAVA SCIRPT

Mobiles Application

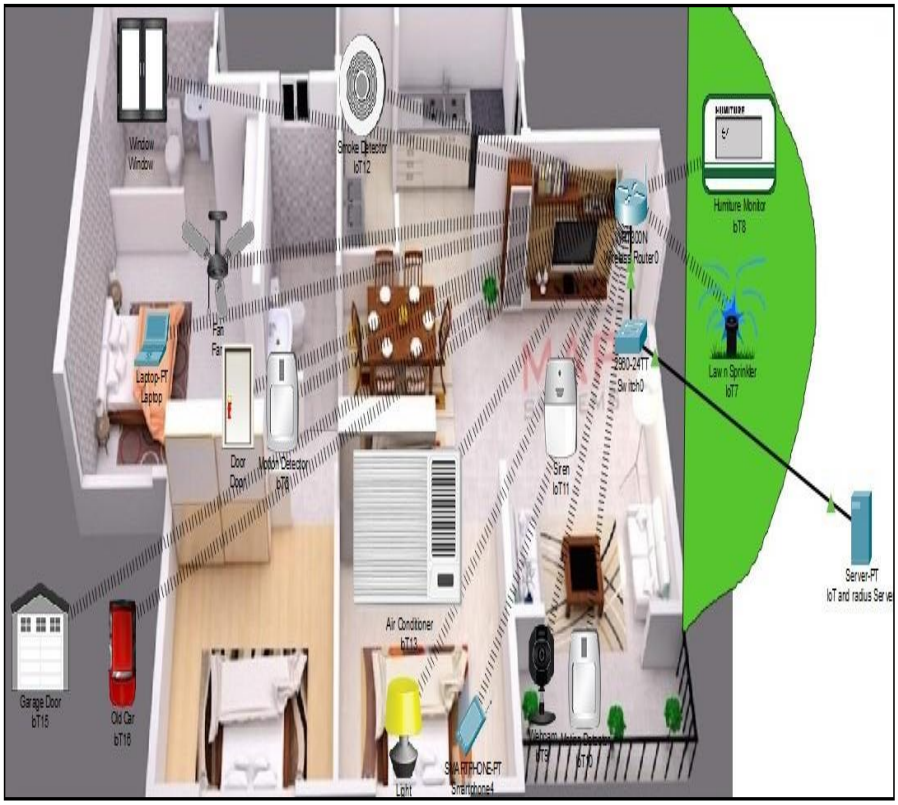
Web Interfaces

Communication Protocol

# CHAPTER 3

# ARCHITECTURE AND DESIGN

The below figure shows the overall design of our system. There is a server setup which is connected to a switch and router. The IoT devices are connected to the server and can be accessed from anywhere within range. The devices can be accessed using a laptop or mobile which is also connected to the network



The design shows how different devices can be connected inside a smart home through the internet of things. The different devices used for design are as follows -

1. IoT and Radius server - Remote Authentication Dial-In User Service is a networking protocol that provides centralized authentication, authorization, and accounting management for users who connect and use a network service.This server is to monitor intelligent things that are recorded on it and to have specific database features .

2. Router(WRT300N) - Used to link different devices to the network of cellular.

3. Laptop - Link to your home destination to access intelligent objects.

4. Smartphone - To access the IoT devices from anywhere.

5. Fan - Used for ventilating the home environment on the basis of certain circumstances.

6. Webcam - For security to see who is coming in the house it gets activated only when the motion detector detects any movement and the webcam takes pictures and sends it to the server.

7. Siren - Provide sound at home for some cases for example if fire breaks out.

8. Motion detector - Link to your home getaway and detect motion.

9. Smart door - Link to your home getaway and detect motion to open or close automatically.

10. Lawn sprinkler - Used as a sprinkler based on environmental water level.

11. Smoke sensor - Used to sense the smoke level.

## CHAPTER 4

# CODE

```
#include <ESP8266WiFi.h>


const char* ssid = "DESKTOP"; // SSID i.e. Service Set Identifier is the name of your WIFI

const char* password = "asdfghjkl"; // Your Wifi password, in case you have open network comment the whole statement.

int R1=D0; // GPIO13 or for NodeMCU you can directly write D7

int R2=D1;

int R3=D2;

int R4=D3;

WiFiServer server(80); // Creates a server that listens for incoming connections on the specified port, here in this case port is 80.

void setup() {

 Serial.begin(115200);

 delay(10);

pinMode(R1, OUTPUT);

 pinMode(R2, OUTPUT);

 pinMode(R3, OUTPUT);

 pinMode(R4, OUTPUT);

 digitalWrite(R1,HIGH);

 digitalWrite(R2,HIGH);
```

```
 digitalWrite(R3,HIGH);
 digitalWrite(R4,HIGH);
 // Connect to WiFi network
 Serial.println();
 Serial.println();
 Serial.print("Connecting to ");
 Serial.println(ssid);
 WiFi.begin(ssid, password);
 while (WiFi.status() != WL_CONNECTED) {
  delay(500);
  Serial.print(".");
 }
 Serial.println("");
 Serial.println("WiFi connected");
 // Start the server
 server.begin();
 Serial.println("Server started");
 // Print the IP address
 Serial.print("Use this URL to connect: ");
 Serial.print("http://");
 Serial.print(WiFi.localIP()); //Gets the WiFi shield's IP address and Print the IP address of serial monitor
 Serial.println("/");
```

```
}
void loop() {
 // Check if a client has connected
 WiFiClient client = server.available();
 if (!client) {
  return;
 }
 // Wait until the client sends some data
 Serial.println("new client");
 while(!client.available()){
  delay(1);
 }
 // Read the first line of the request
 String request = client.readStringUntil('\r');
 Serial.println(request);
 client.flush();
 // Match the request
 if (request.indexOf("/OFF1") != -1) {
  digitalWrite(R1,LOW);
   client.println("HTTP/1.1 200 OK");
   client.println("Content-Type: text/html");
   client.println("");
   client.println("<!DOCTYPE HTML>");
```

```
  client.println("<html>");
  client.println("Relay 1 is ON");
  client.println("</html>");
  client.stop();
  delay(1);
}
if (request.indexOf("/ON1") != -1) {
 digitalWrite(R1, HIGH);
  client.println("HTTP/1.1 200 OK");
  client.println("Content-Type: text/html");
  client.println("");
  client.println("<!DOCTYPE HTML>");
  client.println("<html>");
  client.println("Relay 1 is OFF");
  client.println("</html>");
  client.stop();
  delay(1);
}
if (request.indexOf("/OFF2") != -1) {
 digitalWrite(R2,LOW);
  client.println("HTTP/1.1 200 OK");
  client.println("Content-Type: text/html");
  client.println("");
```

```
  client.println("<!DOCTYPE HTML>");
  client.println("<html>");
  client.println("Relay 2 is ON");
  client.println("</html>");
  client.stop();
  delay(1);
}
if (request.indexOf("/ON2") != -1) {
 digitalWrite(R2, HIGH);
  client.println("HTTP/1.1 200 OK");
  client.println("Content-Type: text/html");
  client.println("");
  client.println("<!DOCTYPE HTML>");
  client.println("<html>");
  client.println("Relay 2 is OFF");
  client.println("</html>");
  client.stop();
  delay(1);
}
if (request.indexOf("/OFF3") != -1) {
 digitalWrite(R3,LOW);
  client.println("HTTP/1.1 200 OK");
  client.println("Content-Type: text/html");
```

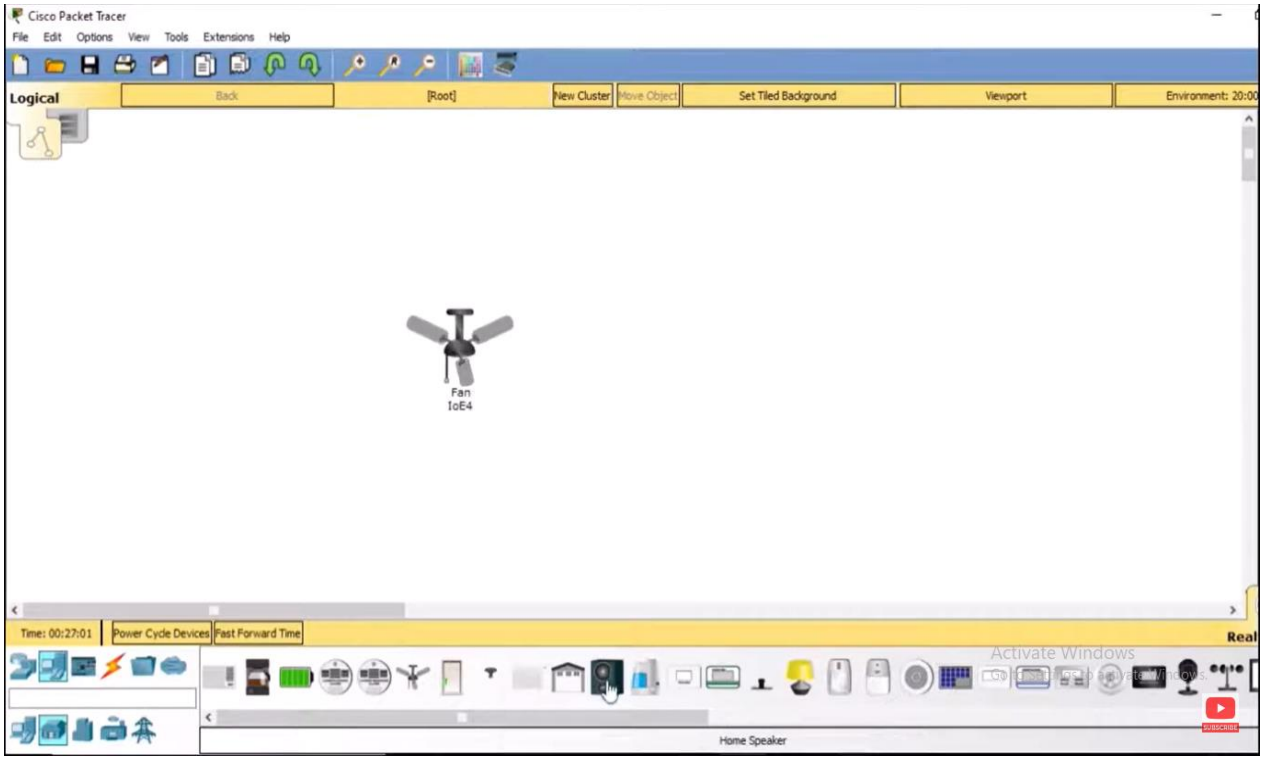
```
  client.println("");
  client.println("<!DOCTYPE HTML>");
  client.println("<html>");
  client.println("Relay 3 is ON");
  client.println("</html>");
  client.stop();
  delay(1);
}
if (request.indexOf("/ON3") != -1) {
 digitalWrite(R3, HIGH);
  client.println("HTTP/1.1 200 OK");
  client.println("Content-Type: text/html");
  client.println("");
  client.println("<!DOCTYPE HTML>");
  client.println("<html>");
  client.println("Relay 3 is OFF");
  client.println("</html>");
  client.stop();
  delay(1);
}
if (request.indexOf("/OFF4") != -1) {
 digitalWrite(R4,LOW);
  client.println("HTTP/1.1 200 OK");
```

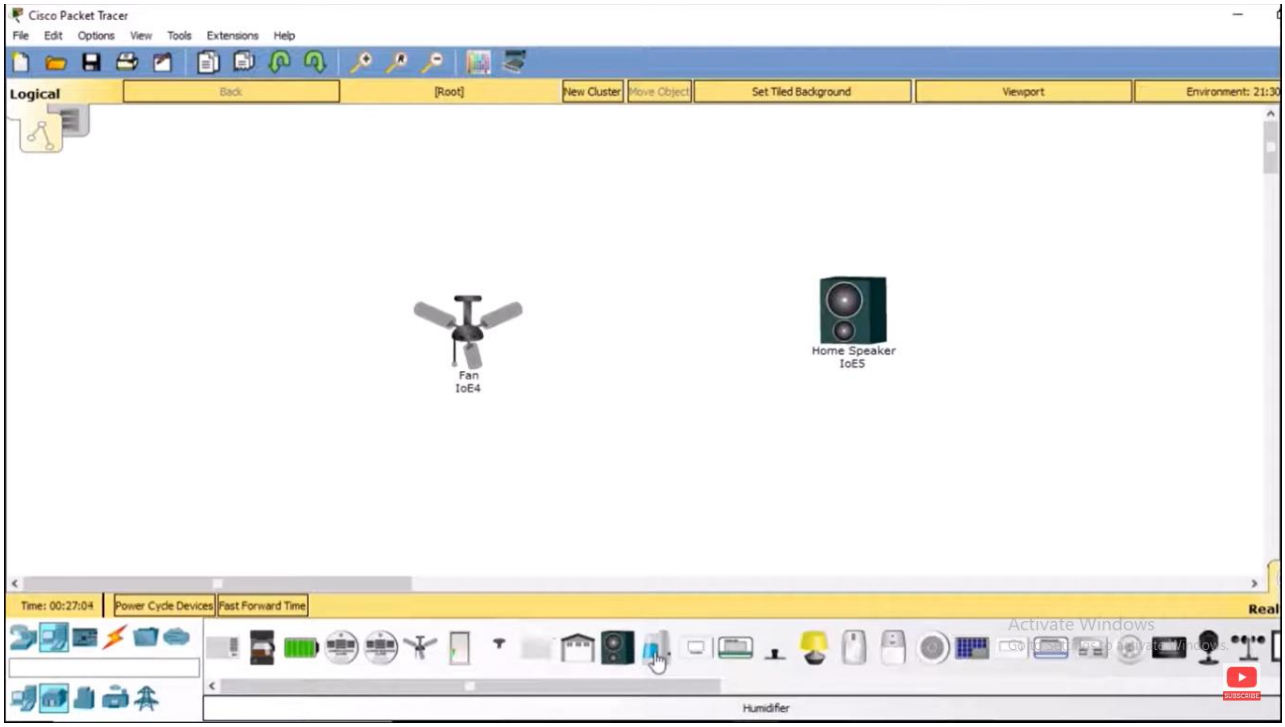
```
  client.println("Content-Type: text/html");
  client.println("");
  client.println("<!DOCTYPE HTML>");
  client.println("<html>");
  client.println("Relay 4 is ON");
  client.println("</html>");
  client.stop();
  delay(1);
 }
if (request.indexOf("/ON4") != -1) {
 digitalWrite(R4, HIGH);
  client.println("HTTP/1.1 200 OK");
  client.println("Content-Type: text/html");
  client.println("");
  client.println("<!DOCTYPE HTML>");
  client.println("<html>");
  client.println("Relay 4 is OFF");
  client.println("</html>");
  client.stop();
  delay(1);
 }
}
```

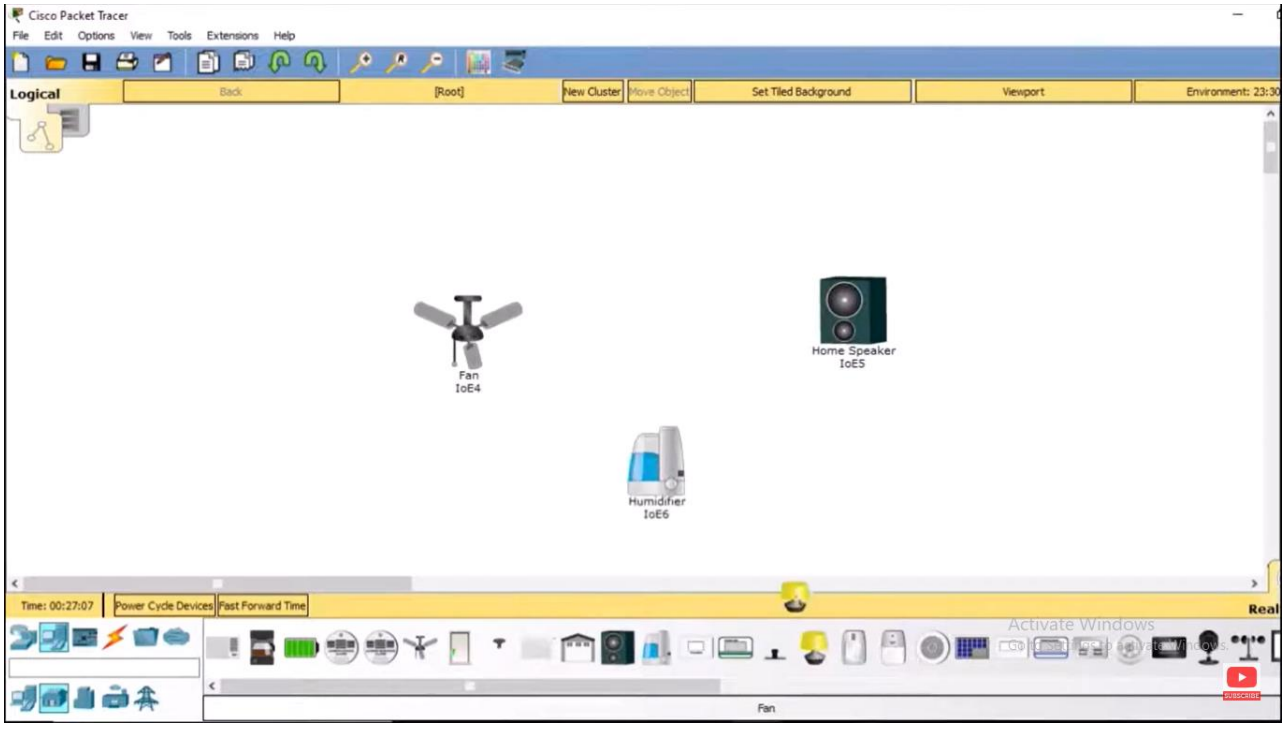
## CHAPTER 5

# IMPLEMENTATION

Including various smart objects which are used for implementing home automation such as windows, fans, lights, doors, lawn sprinklers, webcams and various sensors. The router and server are used for controlling the objects and sensors, which provide a programming environment for controlling objects that are connected and provide control mechanisms through the registration of Home Gateway smart devices.




Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Back
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Environment: 21:30
Fan
IoE4
Home Speaker
IoE5
Time: 00:27:04
Power Cycle Devices
Fast Forward Time
Real
Humidifier


Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Back
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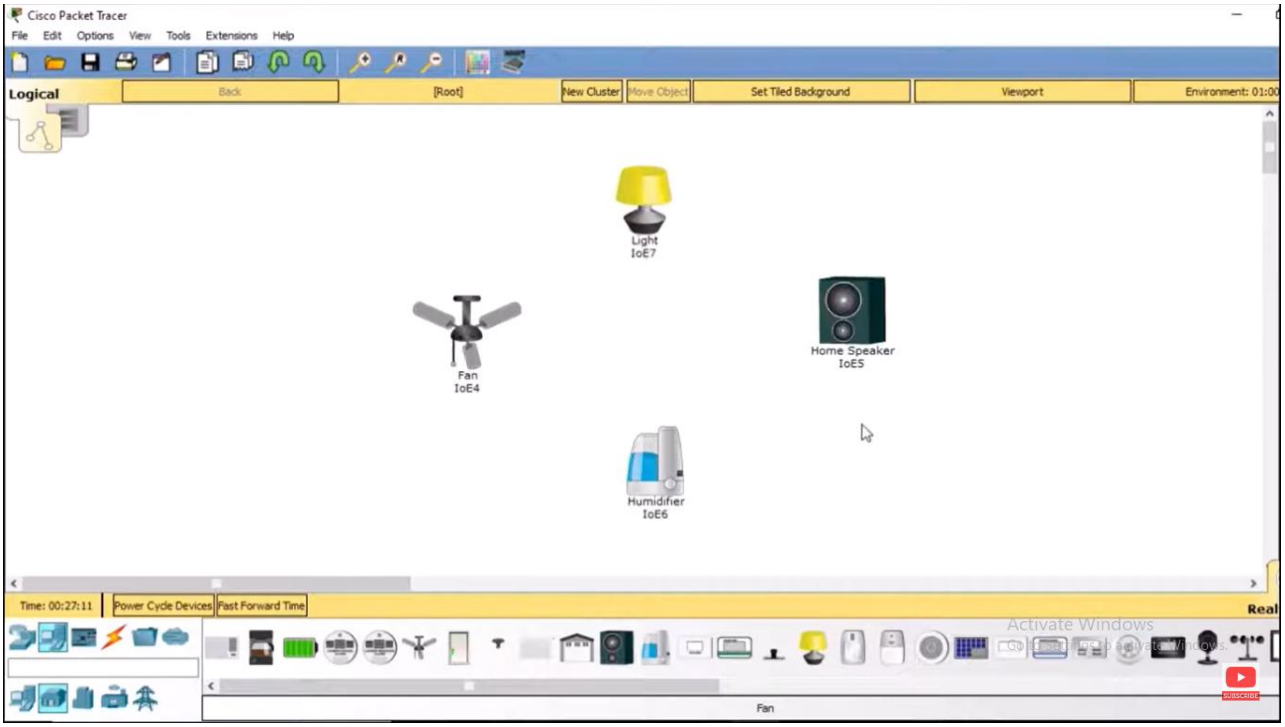
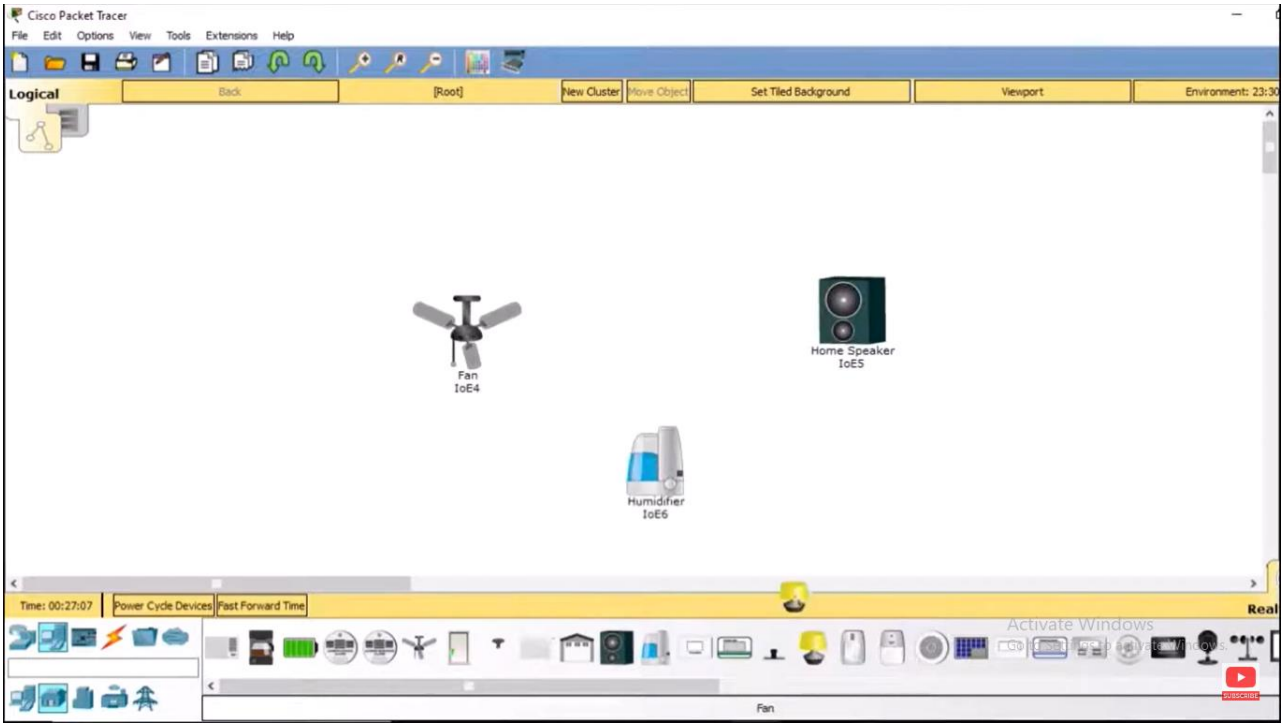
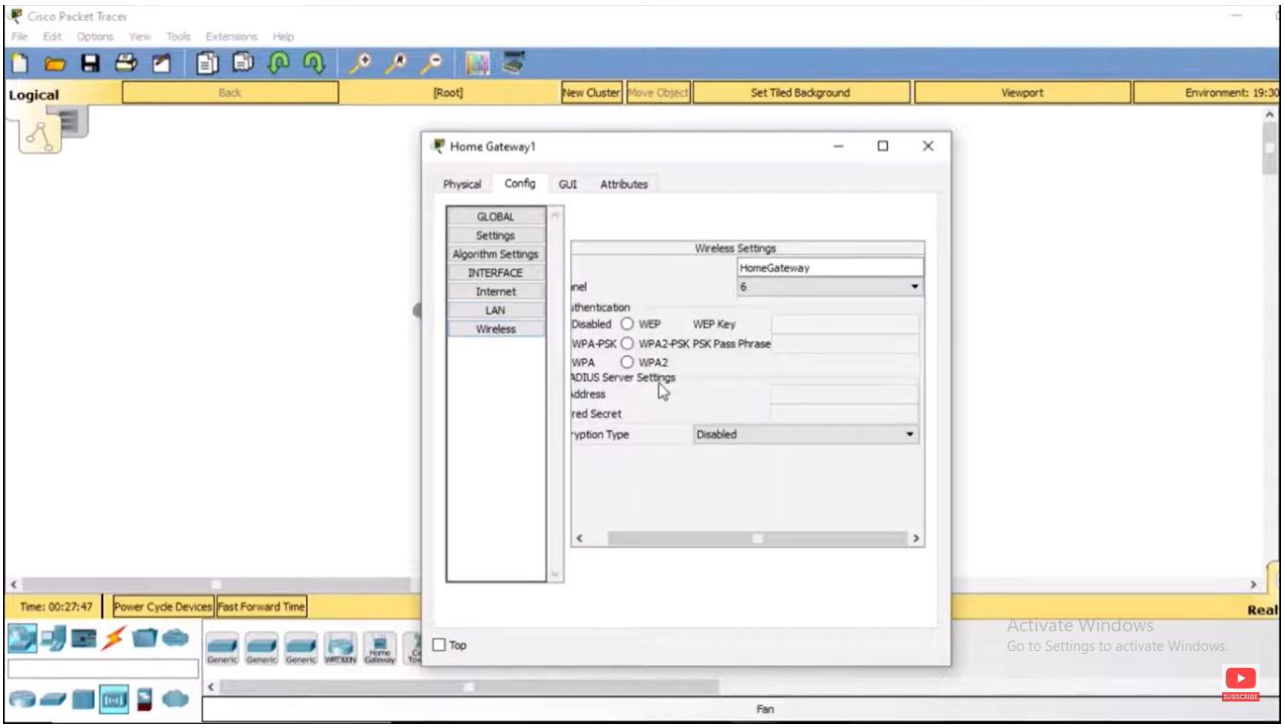
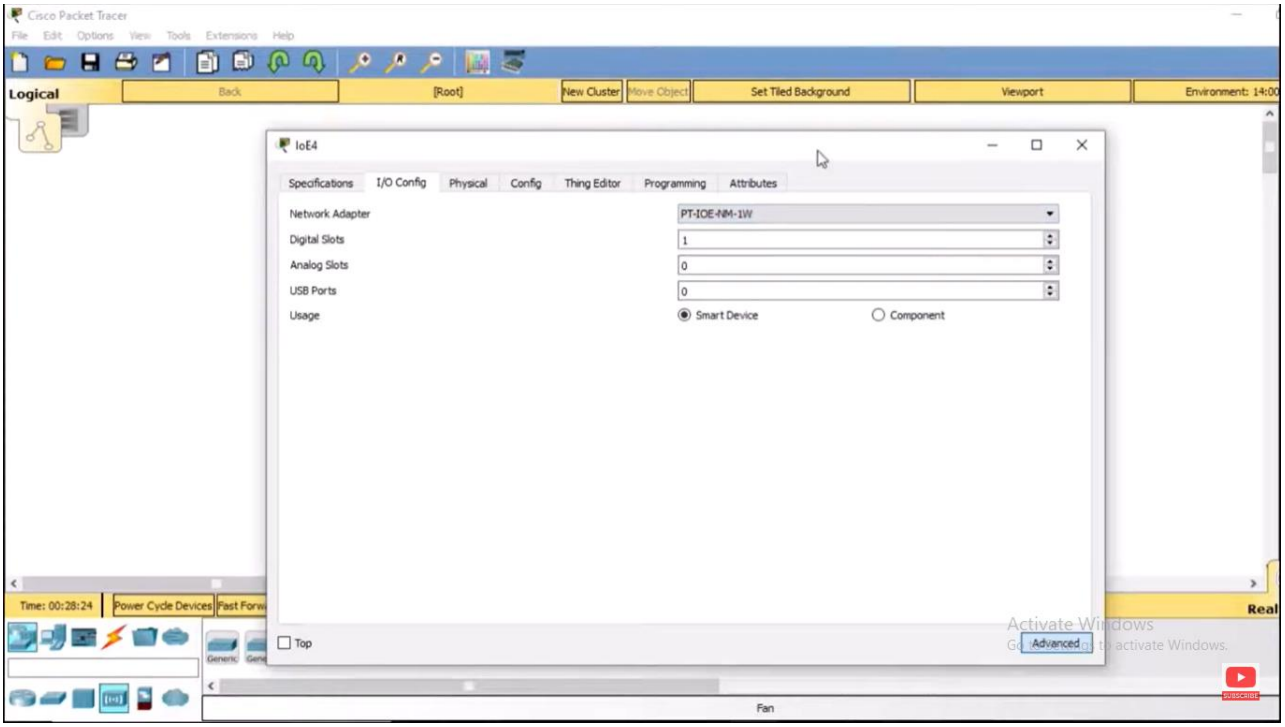
New Cluster
Move Object
Set Tiled Background
Viewport
Environment: 23:30
Fan
IoE4
Home Speaker
IoE5
Humidifier
IoE6
Time: 00:27:07
Power Cycle Devices
Fast Forward Time
Real
Fan


Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Back
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Environment: 01:00
Light
IoE7
Fan
IoE4
Home Speaker
IoE5
Humidifier
IoE6
Time: 00:27:11
Power Cycle Devices
Fast Forward Time
Real
Activate Windows
Fan


Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Back
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Environment: 23:30
Fan
IoE4
Home Speaker
IoE5
Humidifier
IoE6
Time: 00:27:07
Power Cycle Devices
Fast Forward Time
Real
Activate Windows
Fan


Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Back
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Environment: 19:30
Home Gateway1
Physical
Config
GUI
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
Internet
LAN
Wireless
Wireless Settings
HomeGateway
6
Disabled
WEP
WEP Key
WPA-PSK
WPA2-PSK
PSK Pass Phrase
WPA
WPA2
Disabled
Top
Time: 00:27:47
Power Cycle Devices
Fast Forward Time
Fan
Activate Windows
Go to Settings to activate Windows.


Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Back
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Environment: 14:00
IoE4
Specifications
I/O Config
Physical
Config
Thing Editor
Programming
Attributes
Network Adapter
PT-IOE-NM-1W
Digital Slots
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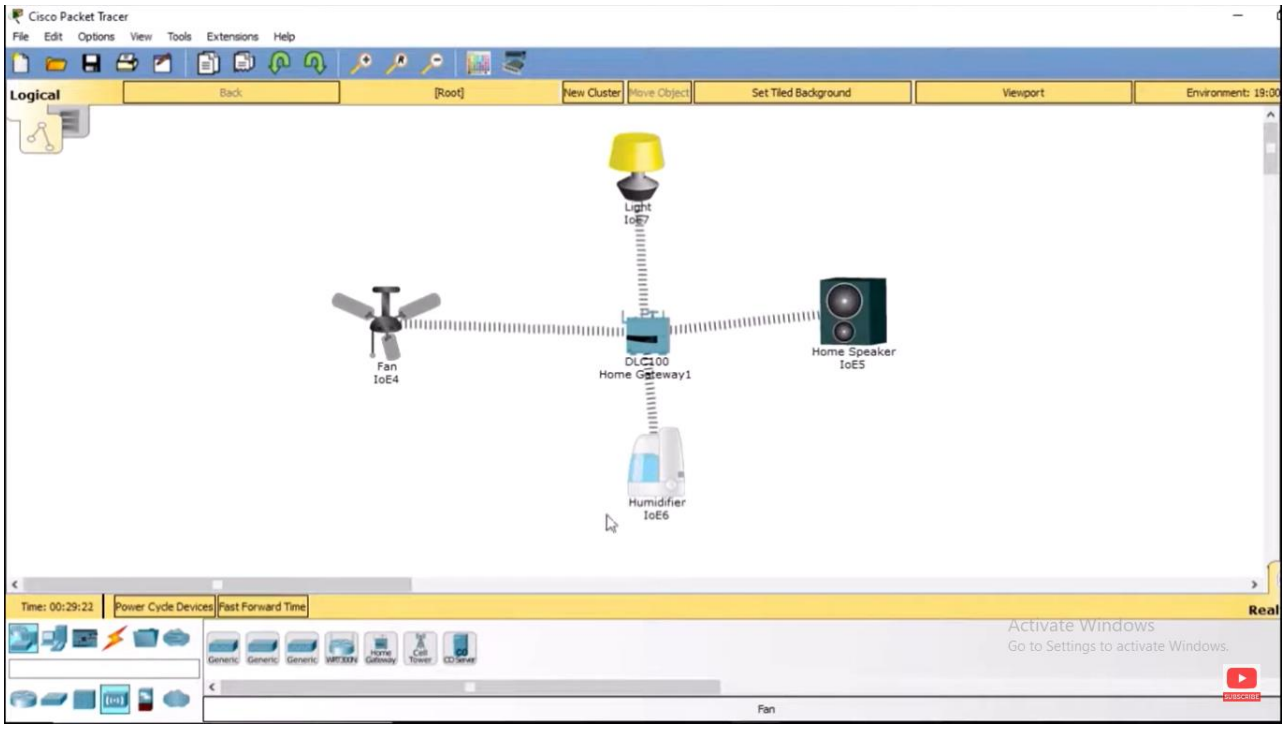
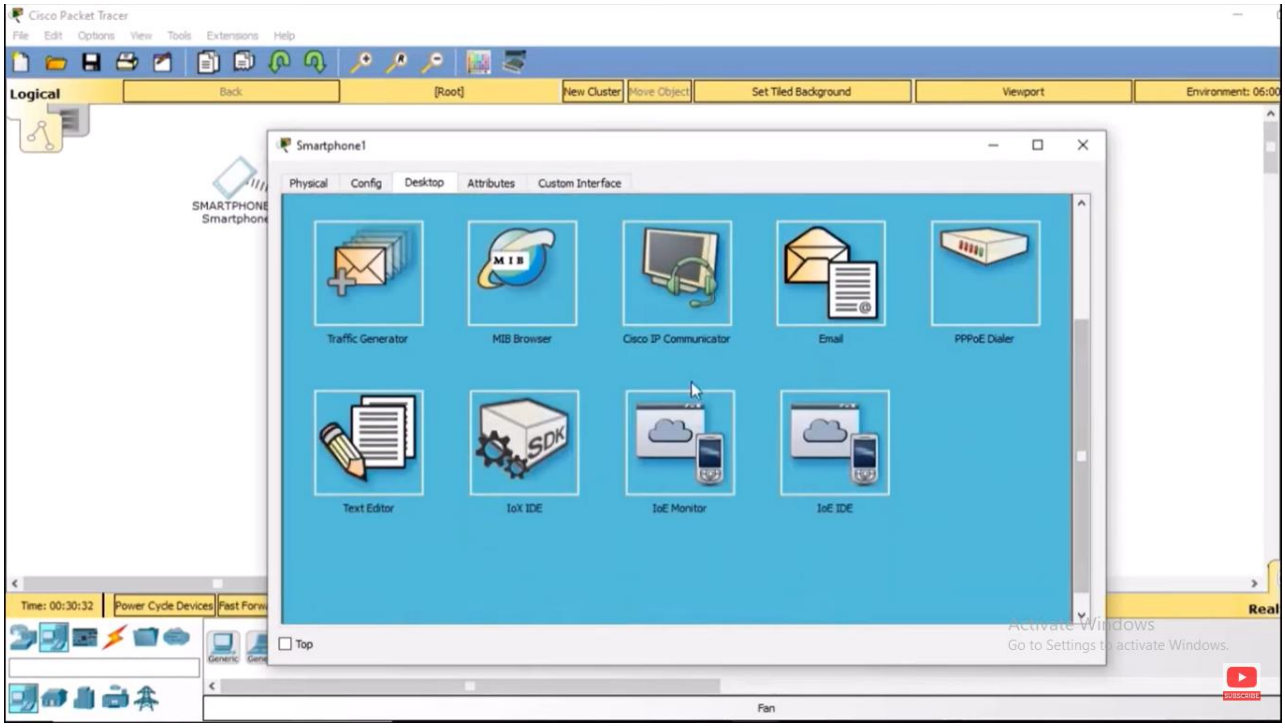
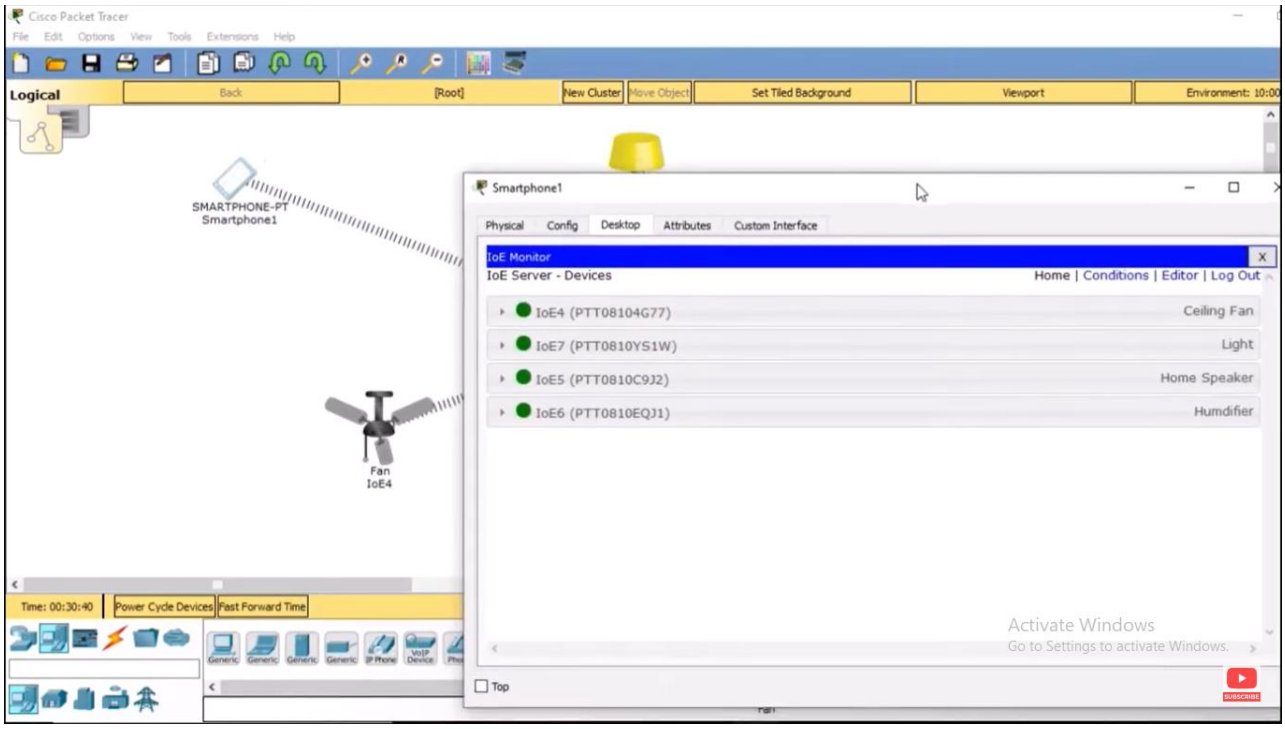
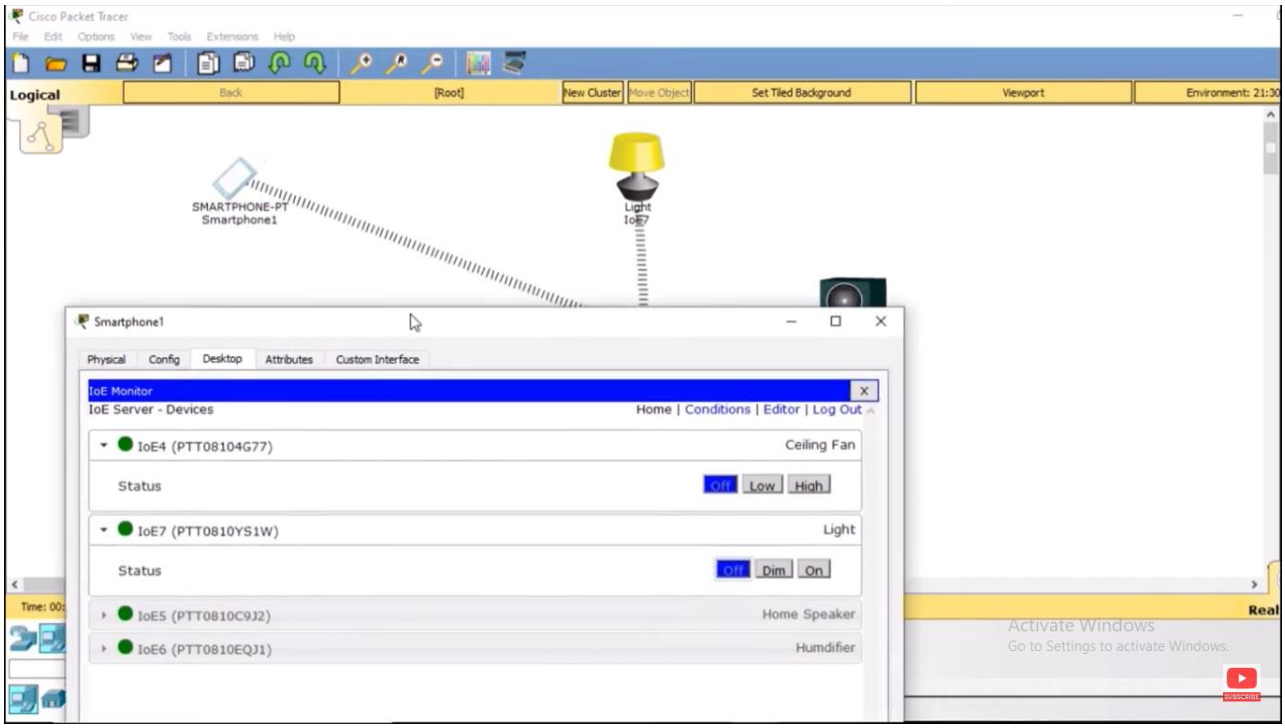
0
Usage
Smart Device
Component
Top
Advanced
Time: 00:28:24
Power Cycle Devices
Fan
Activate Windows


Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Back
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Environment: 19:00
Light
IoE7
Fan
IoE4
DLC100
Home Gateway1
Home Speaker
IoE5
Humidifier
IoE6
Time: 00:29:22
Power Cycle Devices
Fast Forward Time
Activate Windows
Go to Settings to activate Windows.
Fan


Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Back
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Environment: 06:00
Smartphone1
Physical
Config
Desktop
Attributes
Custom Interface
Traffic Generator
MIB Browser
Cisco IP Communicator
Email
PPPoE Dialer
Text Editor
IoX IDE
IoE Monitor
IoE IDE
Top
Time: 00:30:32
Activate Windows
Go to Settings to activate Windows.
Fan


Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Back
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Environment: 10:00
SMARTPHONE-PT
Smartphone1
Fan
IoE4
Time: 00:30:40
Power Cycle Devices
Fast Forward Time
Smartphone1
Physical
Config
Desktop
Attributes
Custom Interface
IoE Monitor
IoE Server - Devices
Home | Conditions | Editor | Log Out
IoE4 (PTT08104G77)
Ceiling Fan
IoE7 (PTT0810YS1W)
Light
IoE5 (PTT0810C9J2)
Home Speaker
IoE6 (PTT0810EQJ1)
Humdifier
Top
Activate Windows
Go to Settings to activate Windows.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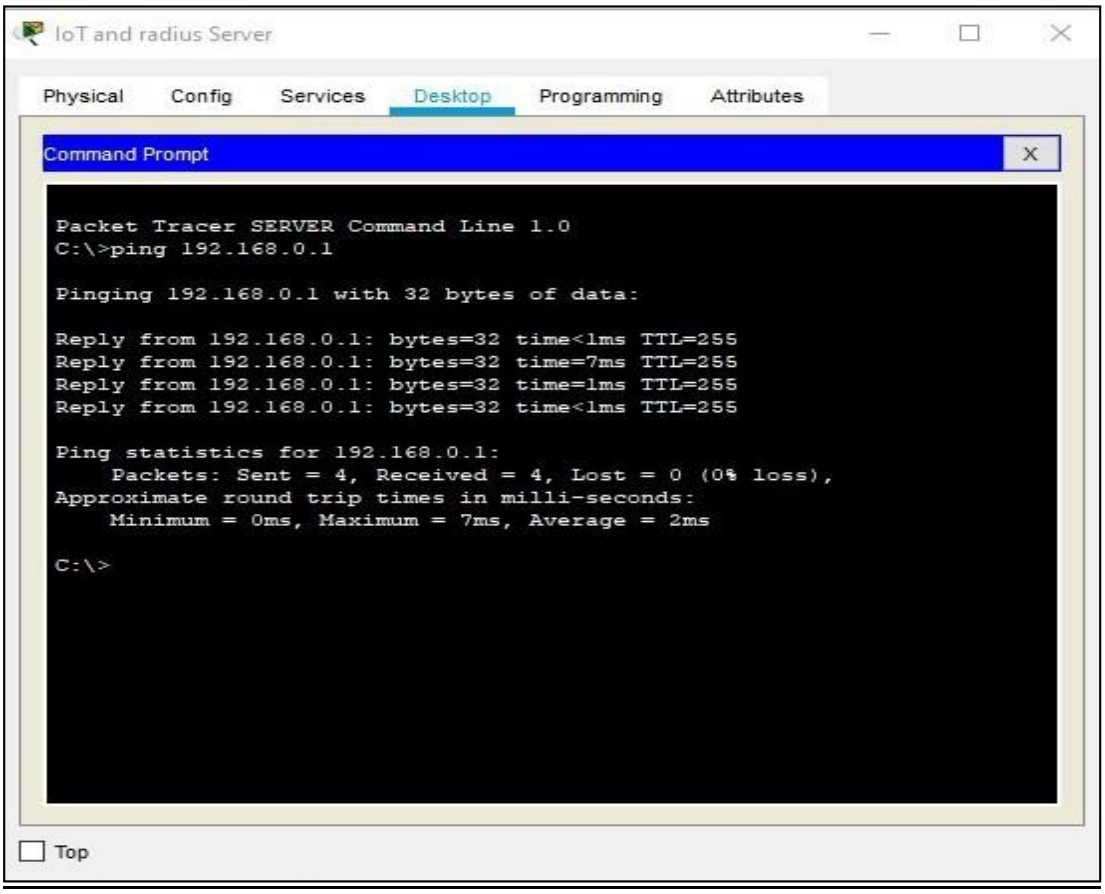
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Environment: 21:30
SMARTPHONE-PT
Smartphone1
Light
IoE7
Smartphone1
Physical
Config
Desktop
Attributes
Custom Interface
IoE Monitor
IoE Server - Devices
Home | Conditions | Editor | Log Out
IoE4 (PTT08104G77)
Ceiling Fan
Status
Off
Low
High
IoE7 (PTT0810YS1W)
Light
Status
Off
Dim
On
IoE5 (PTT0810C9J2)
Home Speaker
IoE6 (PTT0810EQJ1)
Humdifier
Activate Windows
Go to Settings to activate Windows.

ROUTER(WRT300N)

The router is set up with an IP address and default gateway. Then we change the network SSID name to “Home” . In the wireless security section the network mode is selected to WPA2 Enterprise. Then the encryption is selected which we set to AES here. We set the radius server option here to what we registered our server with. Here we also provide the shared password for the router. The figure below show the different configurations of the router. The router is connected to switch and different devices and the server.

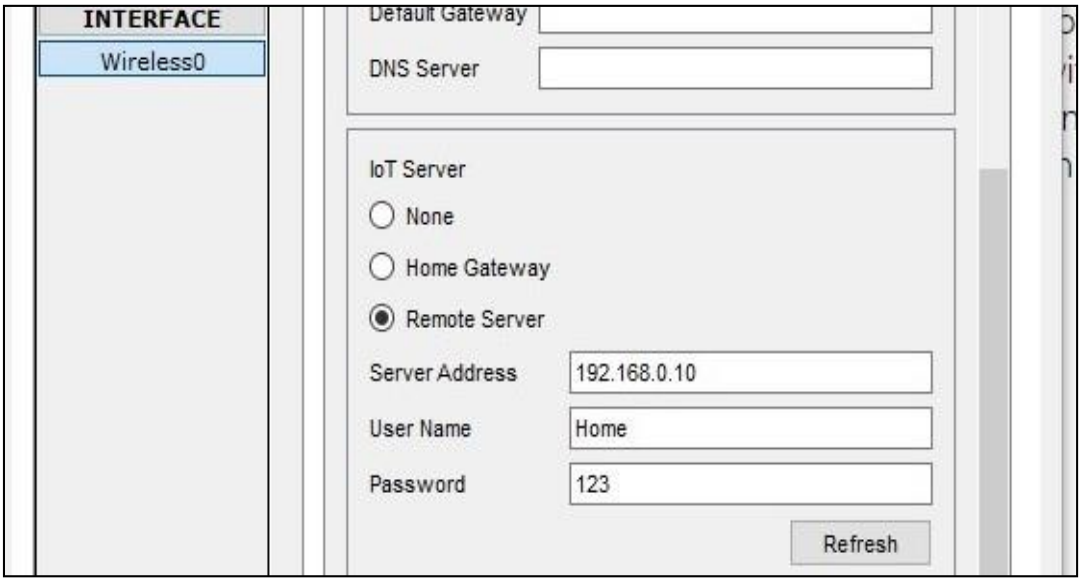


## REGISTERING TO THE SERVER

We connect a laptop to the router by setting up the IP configurations and then register to the server by providing a username and a password. After registering we can login with same credentials to viewthe devices which have been connected to our network and access them.

## SETTING UP DEVICES

For every device the network adapter is set to PT-IOT-NM-1W-AC.After that IoT server is selected as remote server and we provide the IP address of the router along with the password that we registered on the server with. In the wireless configuration part we provide the SSID along with authenencrypttype and username, password of the device with which it has been Registered on server



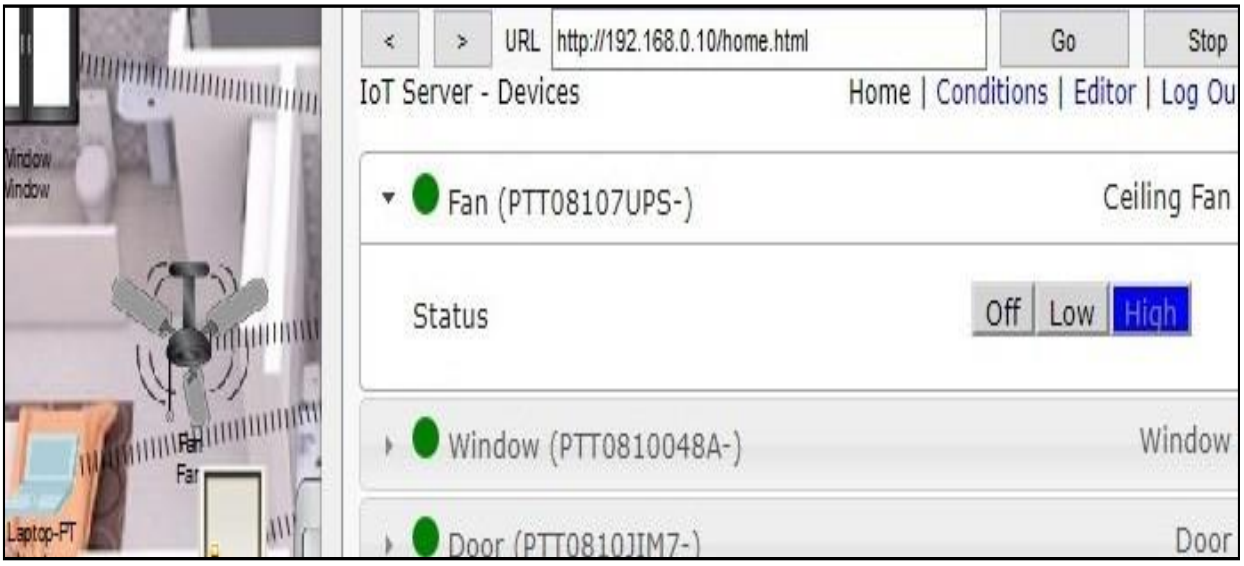
CHAPTER 6

# EXPERIMENT RESULTS AND ANALYSIS

Setting up a WiFi-based home automation system involves several steps, including experimentation and analysis. Below is a general guide on how to conduct such an experiment and analyze the results.

## 6.1. RESULTS

After logging in from the web browser we get the following page from where we can access all the devices which have been connected.As an example, here we can control fan speed



## 6.2 RESULT ANALYSIS

IoT systems are going to replace present day devices rapidly. The analysis which we can draw is that this is a swift and very easy to use system. Once set up people can easily control their home with their laptop or smartphone. The devices are working properly and devices respond according to the condition set.

Cost Analysis-
Cost of smart home systems can be categorized into two parts: installation cost and operating cost. Gesture controlled and Internet controlled systems have comparatively higher installation and operation cost compared to the other systems.

Speed, Range and Accuracy Analysis-
Performance of different smart home systems according to speed, range of operation and accuracy are different. The speed and connection strength varies with distance of the devices. This can also affect accuracy.

Reliability Analysis of Smart Home Systems-
Based on different issues such as cost, range, speed,accuracy, flexibility, GUI and many other things, it is important to determine whether a smart home system is reliable or not. Reliability of smart home systems is quite important to determine because consumers need to have a clear idea of the product before buying it. If a system fails from time to time then customers will not gain confidence in such a system, so it's very important to make thesedevices very accurate.

## 6.3. CONCLUSIONS & FUTURE SCOPE

We used the latest cisco packet tracer version to introduce smart home, as thisversion includes numerous IOE devices. We used the home portal for home automation and record smart devices for monitoring them and microcontroller(MCU-PT) to connect various sensors as well as IOE devices. MCU moreoveroffers computing environment for different devices and different language of programming.

Future scope for the home automation systems involves making homes evensmarter. Homes can be interfaced with sensors including motion sensors, light sensors and temperature sensors and provide automated toggling of devices based on conditions. More energy can be conserved by ensuring occupation of the house before turning on devices and checking brightness and turning off lights if not necessary. The system can be integrated closely with home security solutions to allow greater control and safety for home owners. The next step would be to extend this system to automate a large scale environment, such as offices and factories. Home Automation offers a global standard for interoperable products. Standardization enables smart homes that can control appliances, lighting, environment, energy management and security as well as the expandability to connect with other networks.

# CHAPTER 7

# REFERENCE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