Green University of Bangladesh

Department of Computer Science and Engineering
Faculty of Sciences and Engineering
Semester: (Fall, Year:2022), B.Sc. in CSE(Day)

Final Project Report

Course Title: Computer Networking Lab
Course Code: CSE 312
Section: DD

Project Name: Smart-Office Management System using IoT.

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Submission Date: 05/01/2023
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Project Report Status
Marks: ....   Signature: ....
Comments: ....   Date: ....

Contents

1 Chapter:

Introduction

1.1 Introduction

This is an era of technology; we are surrounded with the technology. Now a day's people become smarter they want to operate each and everything's with his smart phone/laptop/pc without going anywhere, it happens due to IOT devices. That's why in this project we have design a smart office with enhance security.

1.2 Design Goals/Objective

Smart office is an office equipped with different smart objects such smart fan, smart light, coffee maker, smart windows that can be remotely controlled via a smartphone or computer through internet connection. Smart office offers the office owners 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 tasks are done automatically, and safety is one of biggest benefits of a smart office, because we can remotely control the devices and see if there is a danger at any time in our office.

Smart office allows office employee to manage all the office devices anywhere at any time.

2 Chapter:

Design/Development/Implementation of the Project

2.1 Design

Smart Office Network Equipment:
Each network must have devices for transferring information from one node to another. These devices play a significant role in determining the transmission speed of the network, maximum distance, shielding against interference, and the cost of the network. The devices and items that used to design the Smart Office model are server, switch, Personal Computer (PC), laptop, printer, home gateway, webcam, smartphone, motion detectors, light, coffee appliance, smart doors, Radio Frequency Identification (RFID) Reader, Radio Frequency Identification (RFID) Card, fire, fire monitor, fire sprinkler, Micro Controller Units (MCU), and cables.

Connection Setup:
The obvious path to connecting devices together. In this model, the PC and laptop are connected to a switch and the switch is connected to the home gateway using copper straight cables. The smart door, RFID Reader, fire monitor, and fire sprinkler are connected with the MCUs by IoT custom cables. The rest of the used devices are connected to the home gateway wirelessly.

Smart Office Network Topology:
A network topology determines how the devices are connected to each other. There are many types of network topology such as Point-to-Point, Bus, Star, Ring, and Mesh topology. In this model, Star topology is used because of its low power exhaustion. The Star topology makes the network easy to enlarge and scalable.

Smart Office Network Architecture:
There are two types of network architectures that used to design a network. The architectures are Client-server and Peer-to-Peer. In this model, both Clientserver and Peer-to-Peer architectures are used. Client-server architecture responsible for accessing the devices by the smartphone. Peer-to-Peer architecture does not depend on the server.

Figure 1: Full Project Design

2.2 Implementation and Configuration Devices:

Server: Server is a computer provides services to other devices in the network. To connect the Server, choose static addressing and assign an Internet protocol (IP) address for the server as shown in Fig.2. Then, create a connection with a switch using copper straight cable through Fast Ethernet 0 port on the server.

Switch: Switch is a connecting device that forwards packets between computers in the same network. In this model, switch 2960 is used to connect server, PC, laptop, and printer through copper straight cable using Fast Ethernet ports as shown in Fig 3.
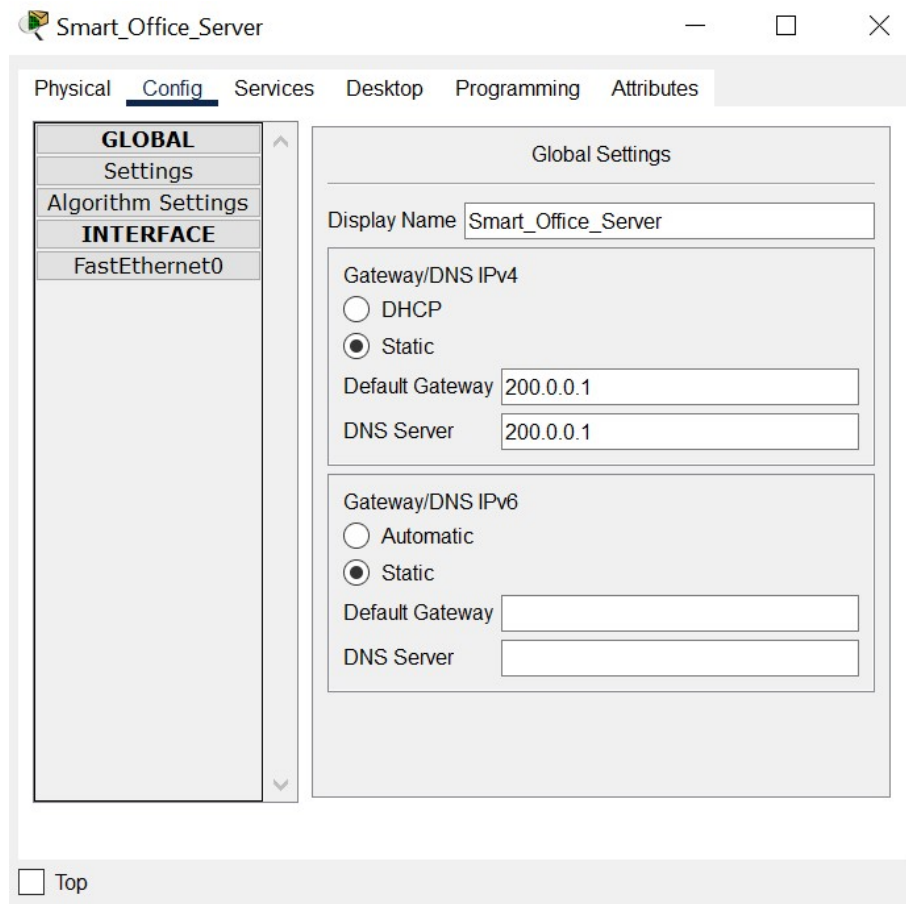
Figure 2: Assigning server IP address

Laptop are multi-purpose devices: In this model,laptop are used to exchange data between employees in the office. To connect the laptop, choose static addressing and assign the IP address for the laptop as shown in Fig. 4. Then, create a connection with the switch using copper straight cable through Fast Ethernet ports.

Smart phone: Smart phone is an electronic device. In this model, the smartphone is used to control the devices wirelessly. Connect the smartphone to home gateway by wireless connection. Then, add configuration conditions for each wireless device.

Motion detectors: Motion detectors are electronic devices used to detect a motion. In this model, two motion detectors are used. One is used for webcam and the other for door, AC, coffee appliance, and light. To connect motion detector to home gateway, choose Advanced to get more options. Then, choose I/O config to add wireless network adapter. At the end, assign the wireless network (home gateway) name.
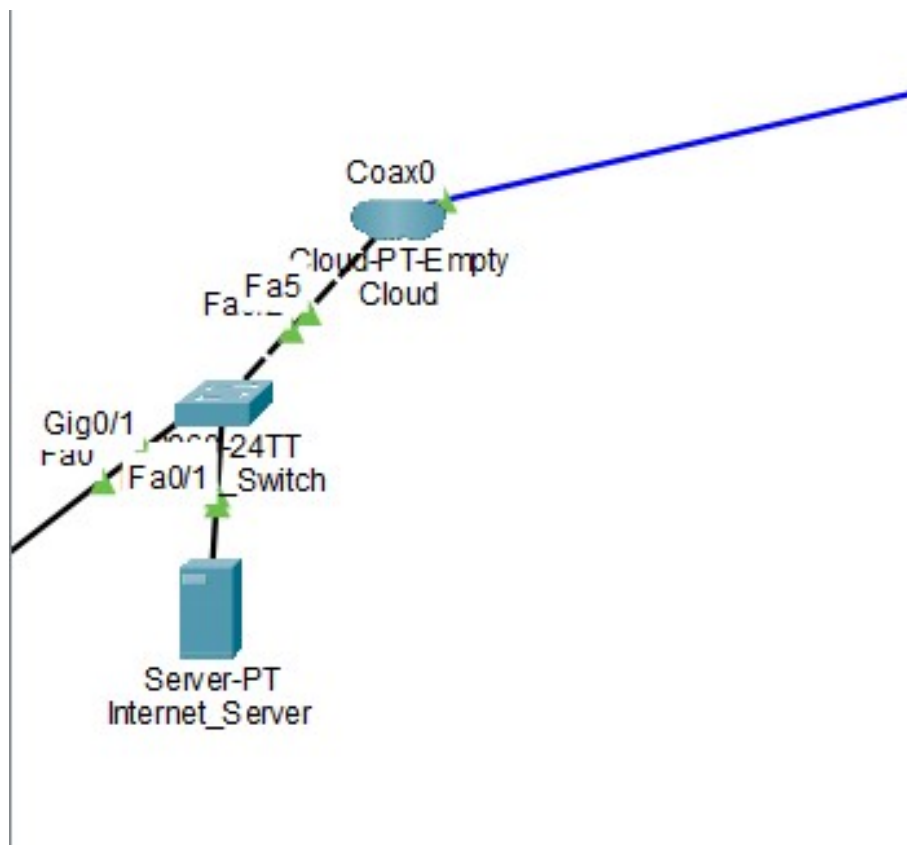
Figure 3: Connecting devices to the switch

Figure 4: Assigning IP address for laptop

Light: Light is a smart device. In this model, light turned on immediately when the motion detector detects a motion. To connect the light wirelessly to home gateway, Choose Advanced to get more options. Then, choose I/O config to add wireless network adapter. At the end, assign the wireless network (home gateway) name.
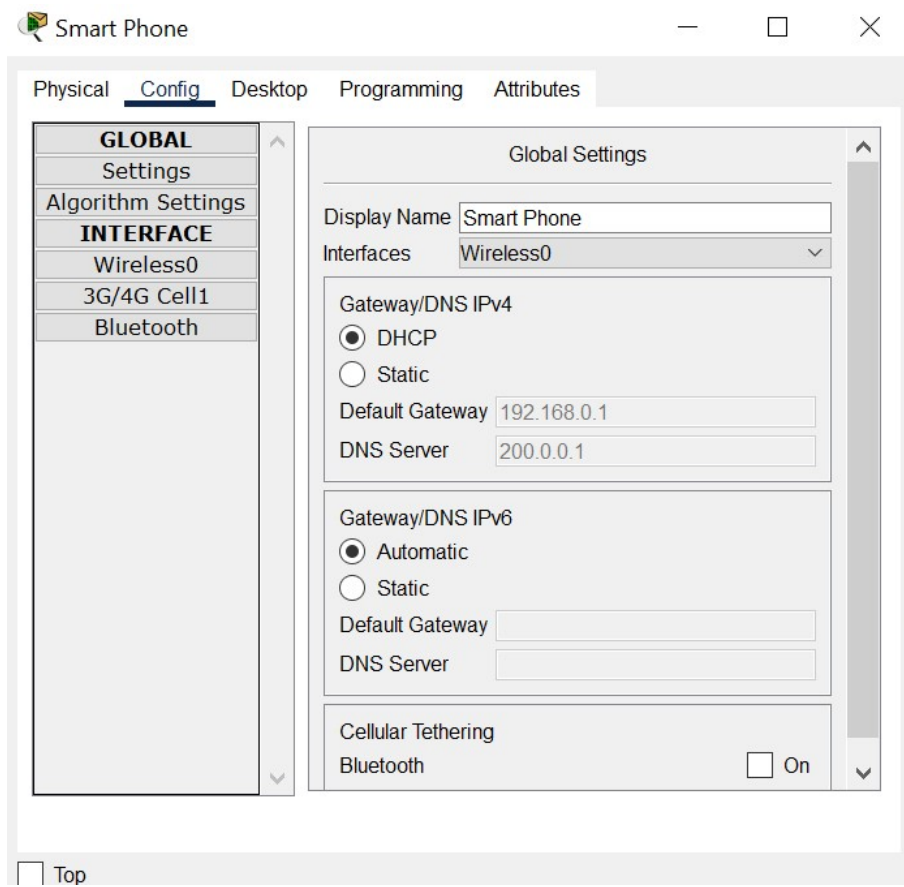
Figure 5: Assigning Configuration for Phone

Coffee Appliance: Coffee Appliance is a smart device. In this model, coffee appliance turns on immediately when motion detector detects a motion as shown. To connect the coffee appliance wirelessly with the home gateway, choose Advanced to get more options. Then, choose I/O config to add wireless network adapter. At the end, assign the wireless network (home gateway) name.

Smart Doors: Smart Doors are objects. In this model, smart doors are used to open and close based on specific conditions. One of the doors is connected with motion detector and the other is connected with MCU and RFID Reader. To connect the door to the home gateway, choose Advanced to get more options. Then, choose I/O config to add wireless network adapter. At the end, assign the wireless network (home gateway) name.

RFID Reader: RFID Reader is a network connected device. In this model, the RFID Reader is connected with MCU and the door using IoT custom cables. RFID Reader used to read the RFID card in order to open the door. A green light will appear on the RFID Reader when the RFID Card is authorized and the door will open as shown in Fig. To connect the RFID Reader wirelessly with the home gateway, choose Advanced to get more options. Then, choose I/O config to add wireless network adapter. At the end, assign the

wireless network (home gateway) name.

Figure 6: Entry Validation of Smart Door

Fire and Fire Monitor: In this model, fire used to show implementation of fire monitor. The fire monitor is a fire detection device that used to detect the fire in the office as shown in Figure. To connect the fire monitor wirelessly with home gateway, choose Advanced to get more options. Then, choose I/O config to add wireless network adapter. At the end, assign the wireless network (home gateway) name.

Fire Sprinkler: Fire Sprinkler is a smart object. In this model, the fire sprinkler is connected with MCU using IoT custom cable. It sprinkle water when the fire monitor detects a fire as shown Figure.

Figure 7: Programming for Fire Sprinkler

Micro Controller Unit (MCU): Micro Controller Unit (MCU) is an open source IoT platform. In this model, two MCUs are used. The MCUs connected with specific smart devices using IoT custom cables. MCUs used Python and Java for programming. One of them used Python code to control on-and-off the fire sprinkler when detects a fire as shown Fig. 16. The other used Java code to open the smart door when the RFID Reader read the authorized RFID Card.

Figure 8: Programming for Micro Controller

3   Chapter:

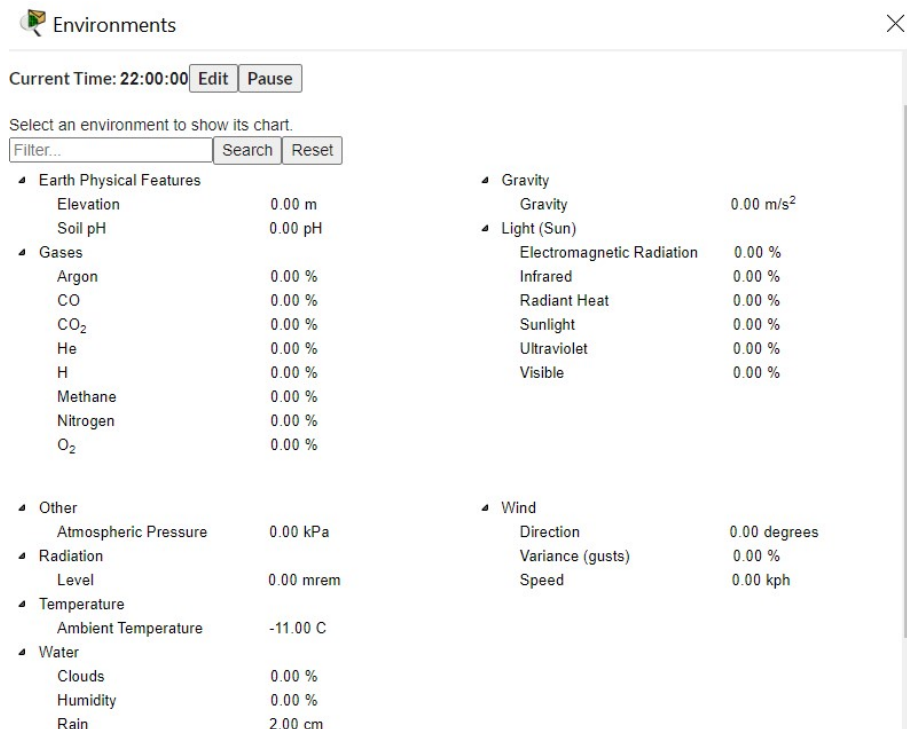## Performance Evaluation

3.1   Simulation Environment

Environments   ✕

Current Time: **22:00:00** | Edit | Pause |

Select an environment to show its chart.

| Filter... | Search | Reset |

⊿ Earth Physical Features		⊿ Gravity	
Elevation	0.00 m	Gravity	0.00 m/s^2
Soil pH	0.00 pH	⊿ Light (Sun)	
⊿ Gases		Electromagnetic Radiation	0.00 %
Argon	0.00 %	Infrared	0.00 %
CO	0.00 %	Radiant Heat	0.00 %
CO_2	0.00 %	Sunlight	0.00 %
He	0.00 %	Ultraviolet	0.00 %
H	0.00 %	Visible	0.00 %
Methane	0.00 %		
Nitrogen	0.00 %		
O_2	0.00 %		

⊿ Other		⊿ Wind	
Atmospheric Pressure	0.00 kPa	Direction	0.00 degrees
⊿ Radiation		Variance (gusts)	0.00 %
Level	0.00 mrem	Speed	0.00 kph
⊿ Temperature			
Ambient Temperature	-11.00 C		
⊿ Water			
Clouds	0.00 %		
Humidity	0.00 %		
Rain	2.00 cm		

Figure: Environment Simulation

3.2 Results and Discussions:
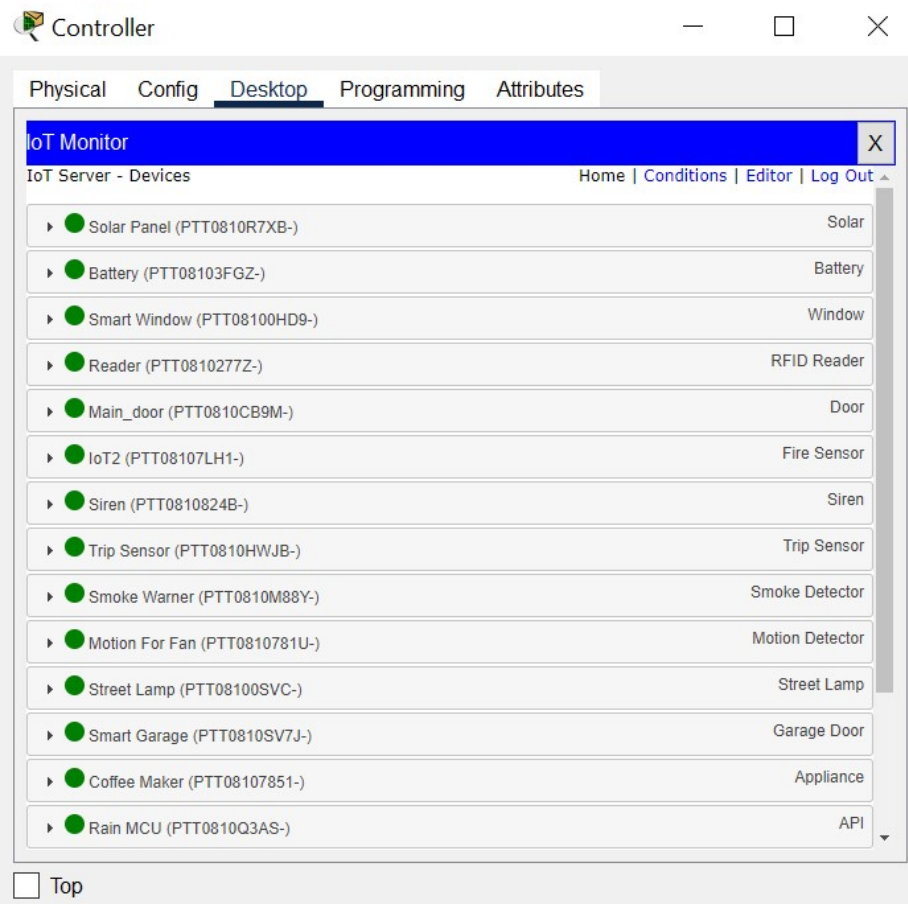
3.2.1 Results:

Figure: List of Iot Device

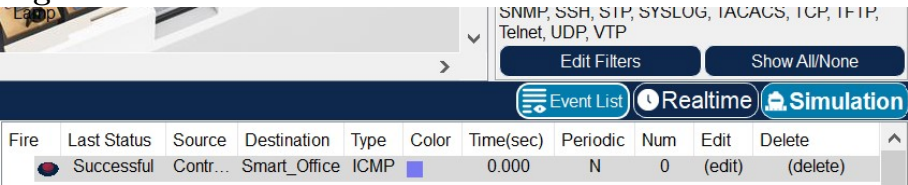**Figure: Result Successfull**

In this Figure shows URL the registration server login using the web browser www. iot. org and shows the list of the devices registered on the IoT server.

3.2.2 Analysis and Outcome:

While all the devices have been configured, they can all be accessed through a web of the smartphone with the URL www. iot. org browser using the correct user name and password.

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 he wants.

4 Chapter:

Conclusion

4.1 Introduction:

Nowadays, technological development and automated system development is a more essential. Internet of Things is a new revolutionary and advanced technology. This project presents the overall design of Smart-Office Automation System with low cost and wireless system. It specifically focuses on the development of an IoT based smart-office automation system that is able to control various components via internet or be automatically programmed to operate from ambient conditions.

4.2 Practical Implications:

In this project, we will design the development of a firmware for smart control which can successfully be automated minimizing human interaction to preserve the integrity within whole electrical devices in the office.

4.3 Scope of Future Work

In future we can use IOT based smart and secure office model has enhanced security and eco-friendly in nature. In this we have used solar panel and battery for the IOT sensors. In case of electricity failure, we can use this.

Complex Engineering Problem

No.	Name of the WP Attribute	Explain how you addressed this attribute
WP1	Depth of knowledge required	Yes.need of average knowledge.
WP2	Range of conflicting requirements	——
WP3	Depth of analysis required	Yes, depth analysis required.
WP4	Familiarity of issues	——
WP5	Extent of applicable codes	——
WP6	Extent of stakeholder involvement	——
WP7	Interdependence	Yes, this project elements are Interdependence.

REFERENCES

References

[1] H. Shrobe, D.L. Shrier, A. Pentland. CHAPTER 13 Data Security and Privacy in the Age of IoT.

[2] U. Sharma and S. R. N. Reddy 2012 Design of Home/Office Automation Using Wireless Sensor Network, International Journal of Computer