YEAR: 2018-19

COMPUTER NETWORKS

(CS435P)

MINI PROJECT REPORT

On

IMPLEMENTING SMART HOME USING CISCO PACKET TRACER SIMULATOR

By

BASIL GEORGE POULOSE (1761002)

NIKHIL NIRANJAN (1761020)

K KARTHIK KRISHNA (1760641)

HADI SAHEER MUHAMMAD (1761005)

Of

4-BTCS-D

Under the Guidance of

Dr. Rekha V.

Department of Computer Science and Engineering

CHRIST UNIVERSITY FACULITY OF ENGINEERING

DECLARATION

We certify that this project is entirely our own work, except where we have given fully documented references to the work of others, and that the material in this assignment has not previously been submitted for assessment in any formal course of study.

We assert the statements made and conclusions drawn are an outcome of our project work. We further certify that

- The work contained in the report is original and has been done by us under the general supervision of our supervisor.
- The work has not been submitted to any other Institution for any other degree/diploma/certificate in this university or any other University of India or abroad.
- We have followed the guidelines provided by the university in writing the report.
- Whenever we have used materials (data, theoretical analysis, and text) from other sources, we have given due credit to them in the text of the report and giving their details in the references.

NAME: BASIL GEORGE NAME: HADI SAHEER

SIGNATURE: SIGNATURE:

NAME: NIKHIL NIRANJAN NAME: KARTHIK KRISHNA

SIGNATURE: SIGNATURE:

COURSE CODE: CS435P

COURSE TITLE: COMPUTER NETWORKS

DATE:

ACKNOWLEDGEMENT

We are grateful to our university, which helped us in many ways. Our sincere thanks to **FATHER Dr. BENNY THOMAS** the director of our university and to **FATHER ANTONY PUTHUSSERY** the campus coordinator for permitting us to develop this project.

We shall thank our head of department **Dr BALACHANDRAN K**, who has been a source of inspiration throughout our project work.

We are highly thankful and indebted to our subject teacher **Dr. REKHA V,** Asst. Professor, computer science department.

We are also thankful to everyone who all supported us, for that we have completed our assignment effectively and moreover on time. They gave us many helpful comments which helped us a lot in preparing this project.

Last but not the least we also thank to all non-teaching staff of the university for their support in successful completion of our project.

BASIL GEORGE POULOSE

NIKHIL NIRANJAN

HADI SAHEER MUHAMAMD

K KARTHIK KRISHNA

ABSTRACT

A computer network is a digital telecommunications network which allows nodes to share resources. In computer networks, computing devices exchange data with each other using connections (data links) between nodes. These data links are established over cable media such as wires or optic cables, or wireless media such as Wi-Fi.

This project is to understand the advantages of a home IoT system. To understand the configuration which is required to set up an IoT system at home, using Cisco switches, sensors, and end devices.

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1. INTRODUCTION

Smart home is a living home that include smart object to improve home activities in advance, that can be automating activities of home without user's involvement such monitoring home environment condition by various sensor (Temperature, Humidity, smoke, wind, sound) then ventilate the environment based on sensor information. Smart home can provide different function rather than providing safety that is security by providing more automate security using different alarm system such siren sound, LCD display and sending email to legitimate user if security issue is detected by sensor. Home automation states managing and controlling home objects by using micro-controller or computer technology. Automation is popular because it provides ease, efficiency and secure environment. In this paper 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.

1.1 IoT

An IoT ecosystem consists of web-enabled smart devices that use embedded processors, sensors and communication hardware to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analysed or analysed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. The devices do most of the work without human intervention, although people can interact with the devices -- for instance, to set them up, give them instructions or access the data.

The connectivity, networking and communication protocols used with these web-enabled devices largely depend on the specific IoT applications deployed.

1.2 ADVANTAGES

- ✓ Data: The more the information, the easier it is to make the right decision. Knowing what to get from the grocery while you are out, without having to check on your own, not only saves time but is convenient as well.
- ✓ Tracking: The computers keep a track both on the quality and the viability of things at home. Knowing the expiration date of products before one consumes them improves safety and quality of life. Also, you will never run out of anything when you need it at the last moment.
- ✓ Tracking: The computers keep a track both on the quality and the viability of things at home. Knowing the expiration date of products before one consumes them improves safety and quality of life. Also, you will never run out of anything when you need it at the last moment.
- ✓ Money: The financial aspect is the best advantage. This technology could replace humans who oversee monitoring and maintaining supplies.

1.3 DISADVANTAGES

- Compatibility: As of now, there is no standard for tagging and monitoring with sensors. A uniform concept like the USB or Bluetooth is required which should not be that difficult to do.
- Complexity: There are several opportunities for failure with complex systems. For example, both you and your spouse may receive messages that the milk is over and both of you may end up buying the same. That leaves you with double the quantity required. Or there is a software bug causing the printer to order ink multiple times when it requires a single cartridge.
- Privacy/Security: Privacy is a big issue with IoT. All the data must be encrypted so that data about your financial status or how much milk you consume isn't common knowledge at the work place or with your friends.
- Safety: There is a chance that the software can be hacked, and your personal information misused. The possibilities are endless. Your prescription being changed, or your account details being hacked could put you at risk. Hence, all the safety risks become the consumer's responsibility.

2. DESIGN

2.1. DEVICES USED

Sl. No.	Device	Function
1.	Home Gateway	Used to register smart object and give IP address to it.
2.	Switch (2960)	Used to provide a combined connection to the gateway for the webcam and its motion detector.
3.	Smart Phone	End Device used by the user to control all the smart devices in the IoT System.
4.	MCU	Used to interconnect two different smart things.
5.	Fan	Used to ventilate the home environment based on some condition.
6.	Webcam	Used to see outside the house after motion is detected.
7.	Lamp	Used as a source of light inside the house.
8.	Motion Detector	Connects to home gateway and detects motion.
9.	Smoke Detector	Detects smoke that arises from a possible fire.
10.	Fire Sprinkler	In the event of a fire, this is activated to put out said fire.
11.	Temperature Monitor	Used to sense the temperature inside the house.
12.	Thermostat	Controls the A/C or the Furnace according to the temperature of the house and given conditions.
13.	Air Conditioner (A/C)	Brings the temperature of the room down; cools the room.
14.	Furnace	Brings the temperature of the room up, warms the room.
15.	Window	Opens when someone walks into the room.
16.	Lawn Sprinkler	Sprinkles water at regular intervals.
17.	Copper Straight-through cables	Used for making simple connections.

3. IMPLEMENTATION

3.1. TOPOLOGY

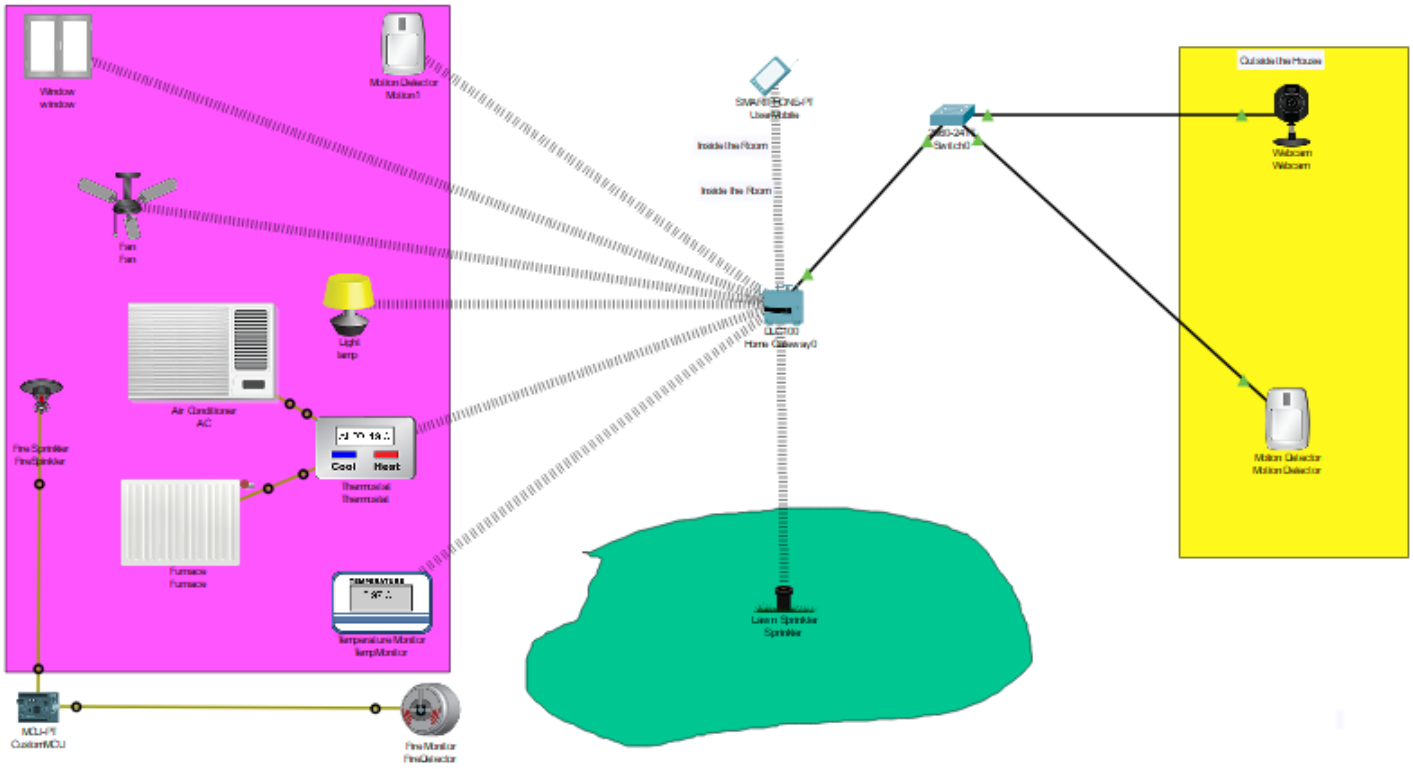


Fig 1.1 Topology of the home IoT System.

3.2. DESCRIPTION

This is a Smart Home system setup, that uses a Home Gateway to connect all the devices together.

All the devices can be controlled from the user's smartphones, and changes can be made to how each device works.

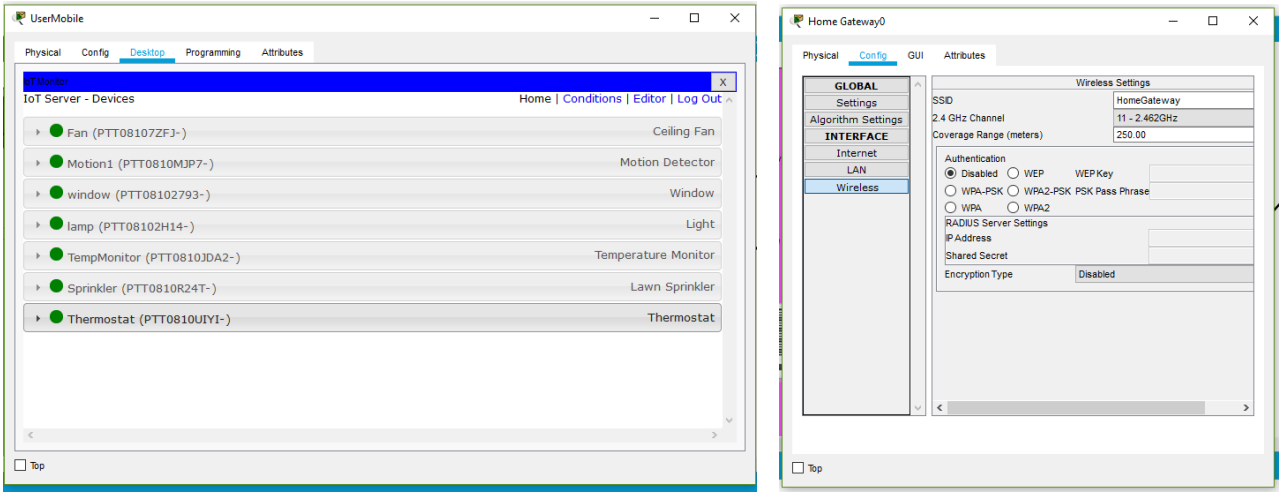


Fig 1.2 Smartphone and Home Gateway Settings.

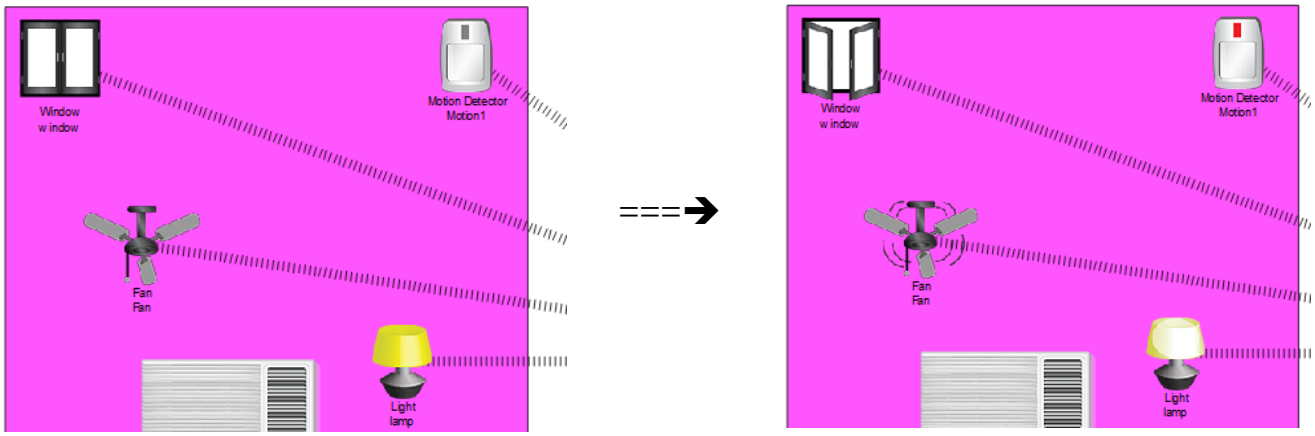
The system can be divided into two basic parts, Indoor and Outdoor.

Indoors, we have several devices, as listed below:

1. Temperature Monitor
2. Thermostat
3. A/C
4. Furnace
5. Fan
6. Light
7. Window
8. Fire Sprinkler
9. Temperature Monitor, and
10. Motion Detector

3.2.1. The Motion Detector System (Indoors)

When someone walks into the house, the motion detector detects it, and activates the fan, the light, and opens the windows as well. These settings can be changed on the user smartphone.



Edit Remove	Yes	Room on	Motion1 On is true	Set Fan Status to High Set window On to true Set lamp Status to On
Edit Remove	Yes	Room off	Motion1 On is false	Set Fan Status to Off Set window On to false Set lamp Status to Off

Fig. 1.3 Working of the Motion Detector System.

3.2.2 The Temperature Control System

Four devices, namely, the temperature monitor, the thermostat, the air conditioner and the furnace work together to maintain the temperature of the house at an optimal level.

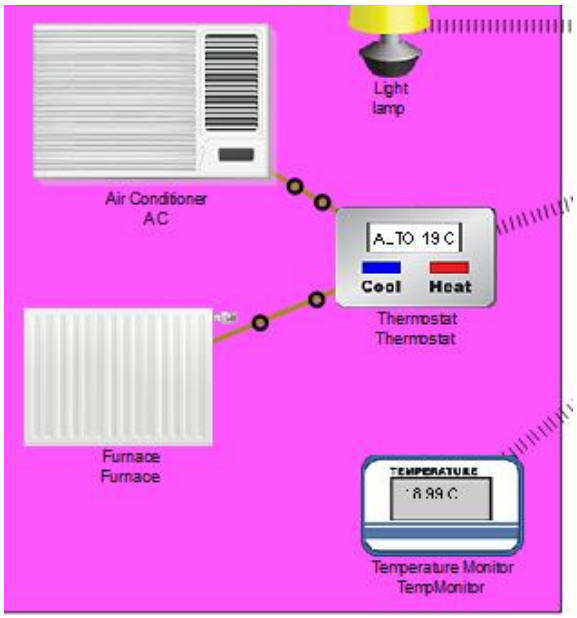


Fig. 1.4 The temperature control system

If the temperature is below a certain threshold, the Furnace is automatically turned on. If the temperature is above a certain threshold, the A/C is automatically turned on. This setting can be adjusted on the user's smartphone.

3.2.3 The Fire Control System

The MCU connects both the smoke detector and the fire sprinkler. The smoke detector picks up on elevated levels of smoke and a signal is sent to the fire sprinkler which sprays jets of water to put out a potential fire. A message will also be sent to the smartphone when the sprinkler is activated.

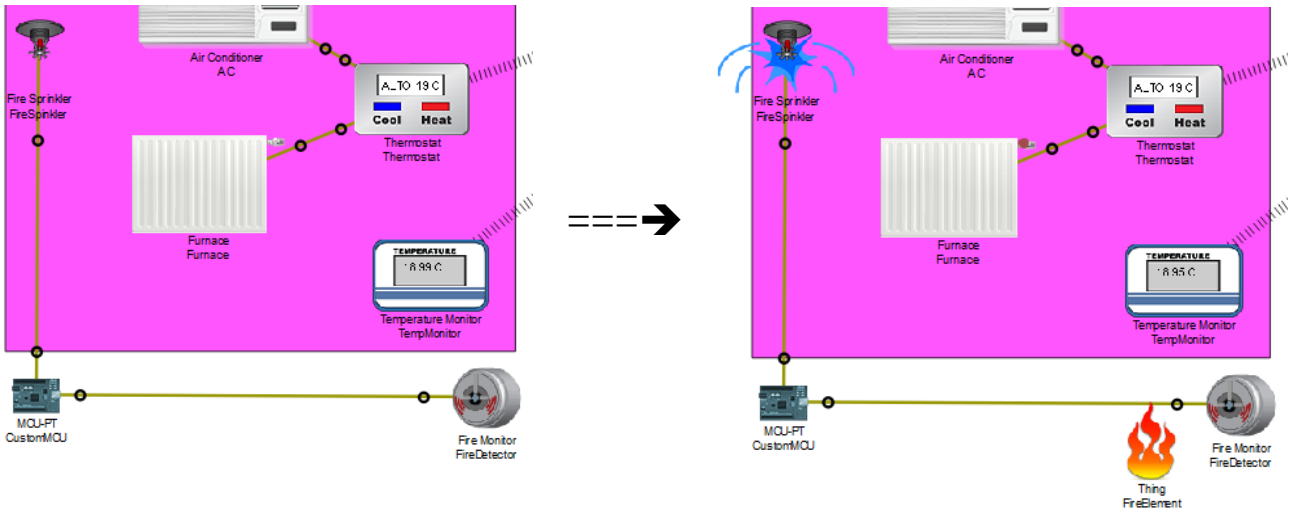


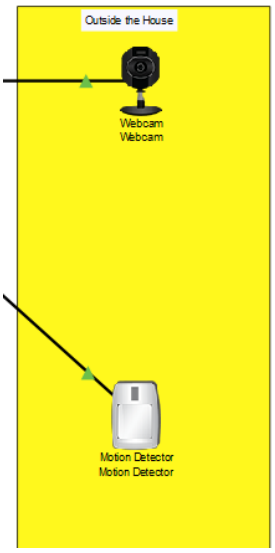
Fig 1.5 Working of the Fire Control System.

Coming to the outdoors, we have the following devices:

1. Lawn Sprinkler
2. Webcam
3. Motion Detector

3.2.4 The Outdoor Activity Detection System

A motion detector is placed near the main door of the house, which when triggered, activates the webcam, and a live feed is relayed to the smartphone.



Actions		Enabled	Name	Condition	Actions
Edit	Remove	Yes	Turn on webcam	PTT08106TDN- On is true	Set PTT08102MR1- On to 1
Edit	Remove	Yes	Turn off webcam	PTT08106TDN- On is false	Set PTT08102MR1- On to 0

Fig. 1.6 Working of the Outdoor Activity Detection System.

3.2.5 The Lawn Sprinkler System

The Lawn Sprinkler activates at regular intervals or can be remotely activated at any time via the smartphone.

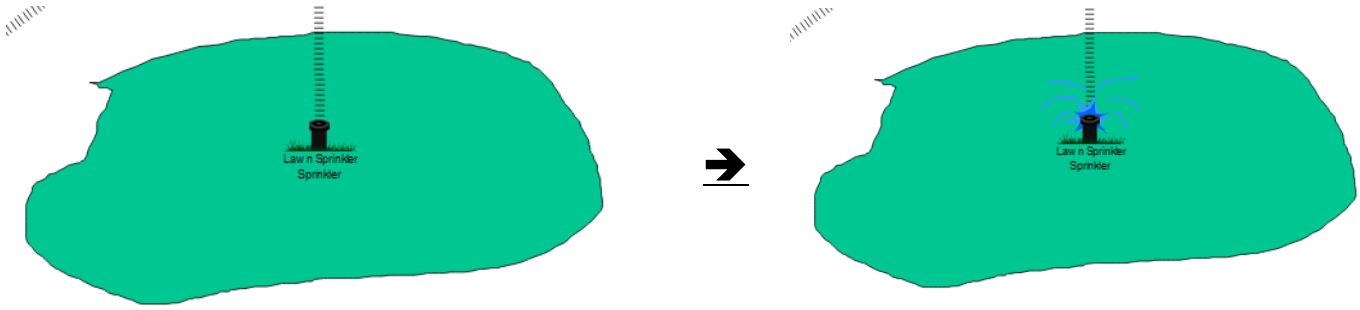


Fig 1.7. The Lawn Sprinkler System in action.

CONCLUSION

In this Project, the design and implementation of a Smart Home using IoT is carried out. The main goal is to optimize the usage of time by minimizing the work that needs to be done to monitor certain tasks carried out in a home. In Metropolitan cities with big households and families, it is hard to keep track of all the small chores that need to be done in the house. It would also be expensive to hire people to do said work. Hence, this is much easier and cheaper to install an IoT automation system which can be accessed via the user's smartphone that takes care of this work. Because of this work, the solution implemented can be modified according to the current home requirements. This is especially useful, because the requirements are different from home to home.

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