Home Automation Using Packet Tracer and ESP8266

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Abstract:

The technology has been growing from day to day in human life. The basic need of human to lead his/her life comfortably is a home. A home with updated latest technology which means a smart home. In such a scenario, there is a need to have an endeavour to have everything at the push of a button away, and more importantly, automated. Home Automation is such an endeavour, in which, all the electrical appliances present at home are connected to each other, having interactions with sensors placed at strategic positions in a closed loop manner to perform meagre tasks automatically, leaving less burden on the humans. With this project we are promoting the fact that Home Automation can greatly contribute to energy conservation too. This paper gives the basic idea use cisco packet tracer to implement smart home. Cisco implemented (IoT) functionalities in the latest version of the platform, and now it is possible to add all the smart devices, sensors, actuators, and devices, which simulate microcontrollers like Arduino or Raspberry Pi to the network. All IoT devices can be run on generic programs or modified by Java, Python or Blocky programming them. This makes Cisco Packet Tracer a perfect method to construct functional simulations for IoT.

Keywords: Seclusion; Internet of Things; Seclusion-enhancing Technology; Legislation; Threats

1.   **INTRODUCTION**

1.1 Introduction

sensors, heat sensors, smoke detectors. The data they acquire are then sent to the microcontroller unit, which then processes the data and performs specific switching of the Home Appliances in a real time fashion. In this project we have set these In today's technologically growing world technological development without becoming a requirement that is frequently used in today's human life.

The most important part in a fully automated system are the sensors, be it [1]IR motion specific objectives for our version of the automated system.

- Turn ON all the appliances when a person enters the room.
- He/They can then turn them ON or OFF using an IR remote, or use a web application for the purpose as convenient.
- Turn off everything whenever everyone leaves the room, in other words, when there are no one inside.
- A person can remotely access the home appliances if he feels the need be.
- A person can remotely access the home appliances if he feels the need be.

1.2 Arduino Uno:

According to the description given in the Arduino Website, "Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button."

Arduino is an open-source project aiming at developing greater curiosity towards DIY projects among students and enthusiasts. Along with the development board, comes the Arduino IDE based on a programming language called Processing for programming the microcontroller.

1.2 ESP8266 Wi-Fi Module:

Fig.1.1: Arduino Uno Development Board

The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and microcontroller capability produced by Expressif. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections
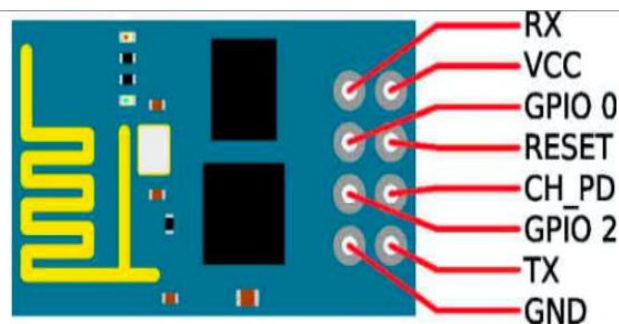
Fig.1.2: Pin diagram of ESP8266

using AT commands. The very low price and the fact that there were very little external components on the module which suggests that it could eventually be very inexpensive in volume make it the component of choice for our needs.

2.MOTIVATION

Through the simulation framework based on cisco packet tracer (version 7.2), smart home system can be implemented. Cisco Packet Tracer is a tough Cisco system Academy network modelling application that can simulate/create a network without a physical network. It has a drag and drop interface that, while configuring complex networks, is simple to use yet highly effective [2], [3]. Additionally, Cisco Packet Tracer (version 7.2) can operate as a hybrid network that combines real networks with virtual networks [4]. This latest version of cisco packet tracer (7.2) is also added to MCU-PT board single boarded computers (SBC-PT) [5], offering programming environment to power connected devices. Newly released Packet Tracer advantages are:

- Provides the practical IOT machine simulations and visualizations.
- Allows users to plan, create, customize smart homes, smart cities by supplying them with various smart objects.
- Provide board for the control of intelligent objects.
- Allow students to explore the concepts of IOE principles. • Provide sensor detector.

3 METHODOLOGY

Including various smart objects which are used for implementing home automation such as chic windows, chic fans, chic lights, chic doors, chic garbage doors, lawn sprinklers, fire sprinklers, cell towers, web cams and various sensors. The Microcontroller (MCU-PT) and Home Gateway[6] are used for controlling the objects and sensors, which are providing programming environment for controlling objects that are connected and provide control mechanisms through the registration of Home Gateway smart devices.

A HOME GATEWAY:

- The IoE Things can register directly with the IoE service on a home gateway or network database.

- The Home Gateway offers 4 Ethernet ports and a wireless contact point on channel 6 equipped with the SSID [7] "Home Gateway." It is possible to configure WEP / WPA-PSK/ WPA2 companies to wireless links are safe for connections. Image (1b) displays 7 IOE items connected to a Home Gateway.

- The home gateway is connected via the WAN Ethernet port[8] on the internet. A home gateway and a web interface it is easy to manage the IOE system. The internal IP address of the Home Gateway (LAN) is 192.168.25.10, but it can be too reached via its IP address in front of the Internet.

The figure (3b)above indicates that the smart objects are associated to the home gateway by Wireless medium and Ethernet cable for local and remote control of smart devices. Home portal also acts as a DHCP server [9] assigns IP addresses to any, connected smart device.
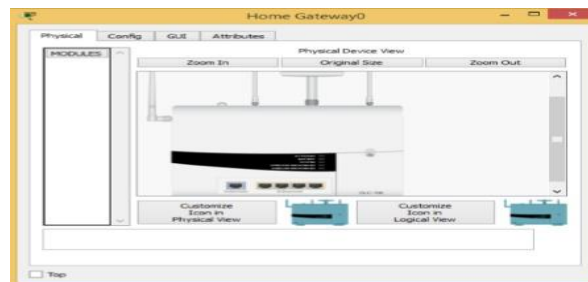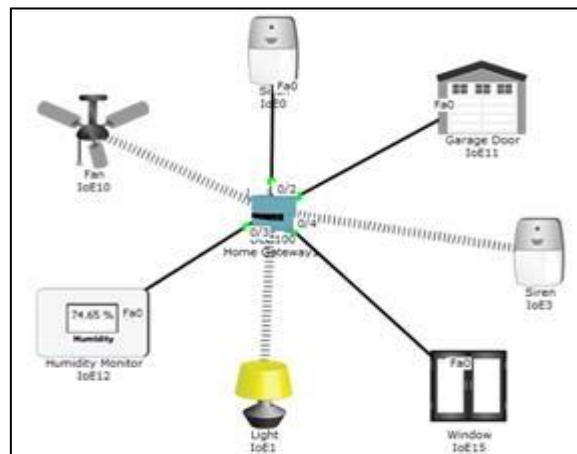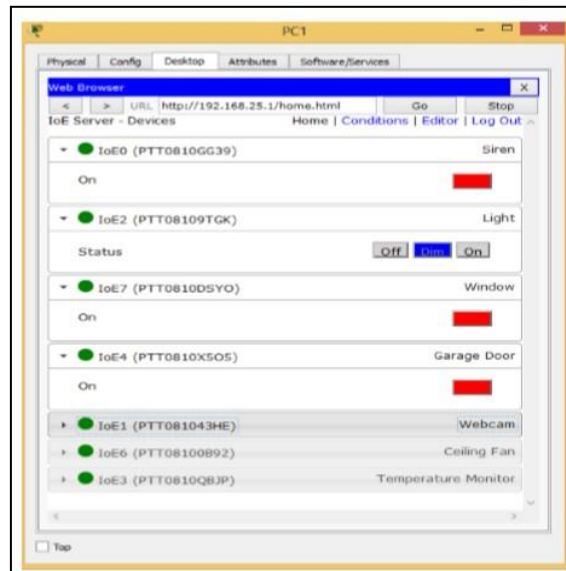

Fig 2(a) Home GateWay

Fig 2(b): *Home portal with seven linked smart things*

Fig 2(c): *shows IOE devices that are connected on home*

***Fig 2d:*** *registered IOE device with their status*

After registering the smart device [10], [11] to the home gateway, the figure above shows that all devices are accessed by legitimate users via the web. Figure 4 shows that seven IOE devices that are legally regulated are registered in the Home gateway, which are controlled by legitimate individuals [12], [13] through the web.
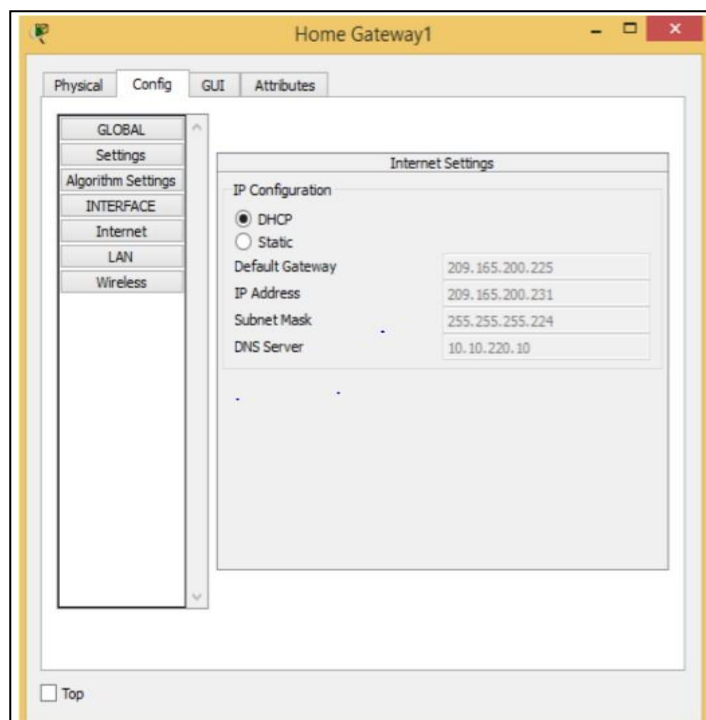
B. MICROCONTROLLER (MCU-PT) BOARD

The microcontroller board is used to connect different chic objects internally and to offer programming upbringing with various languages to monitor the linked smart object (see figure below).

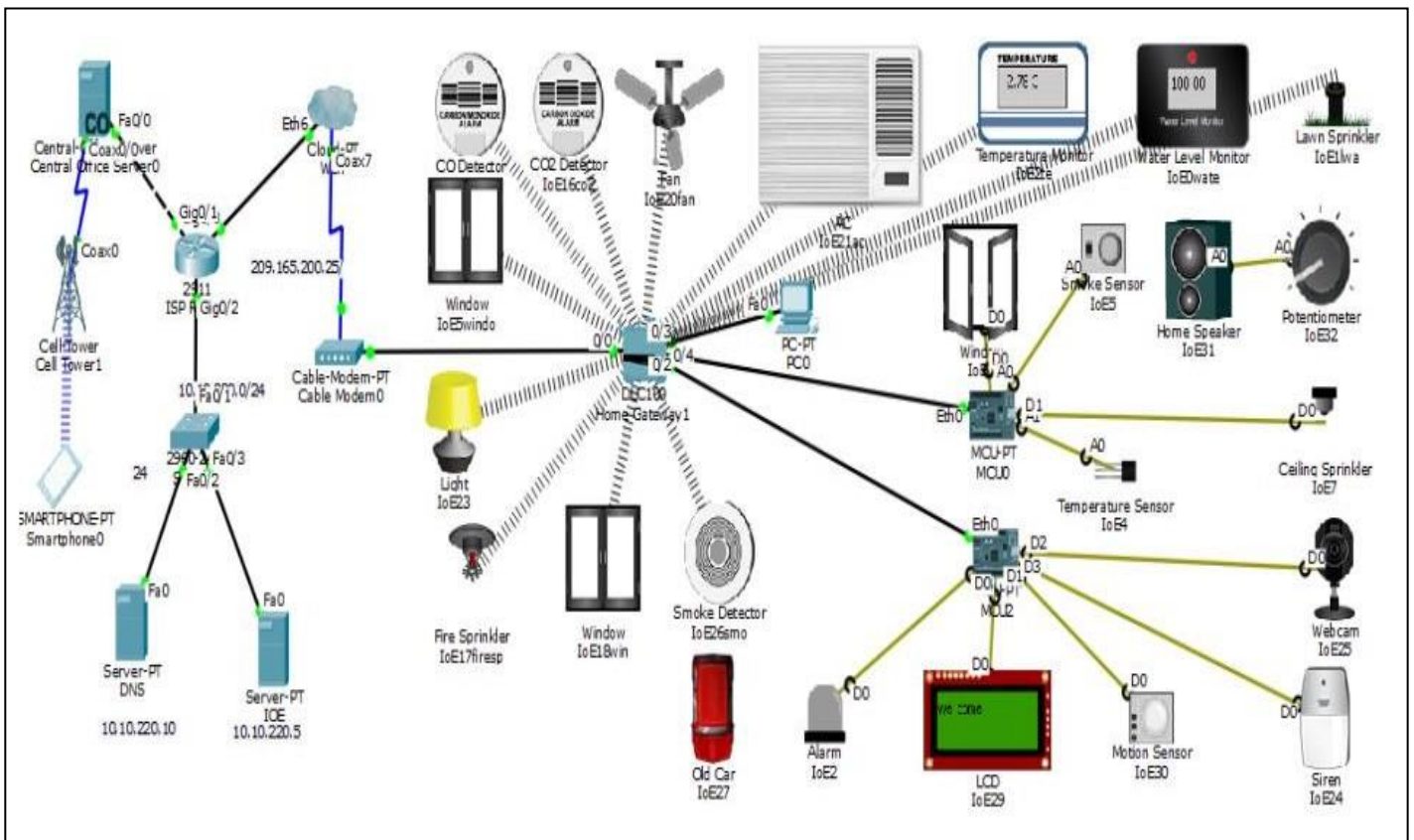***Fig 2(e):*** *MCU programming environment*
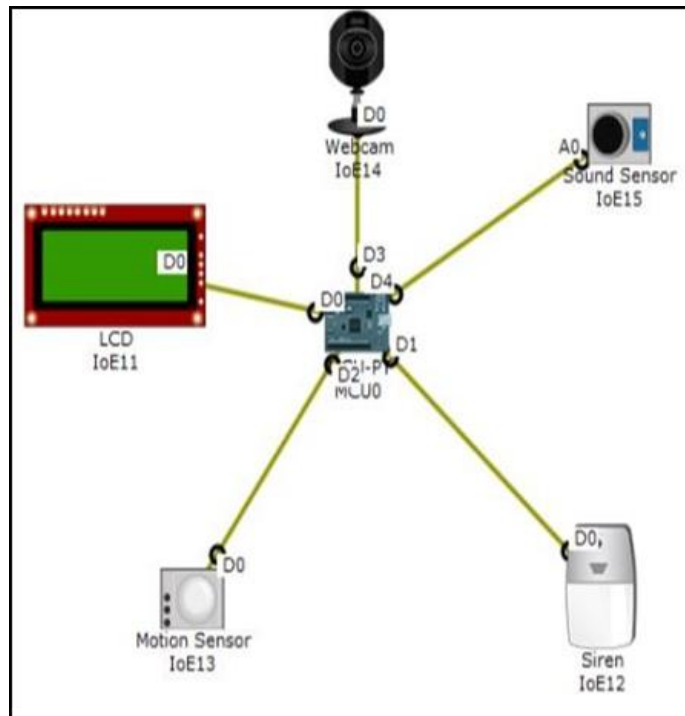
Fig 2(f): *IOE device connected too MCU Board*
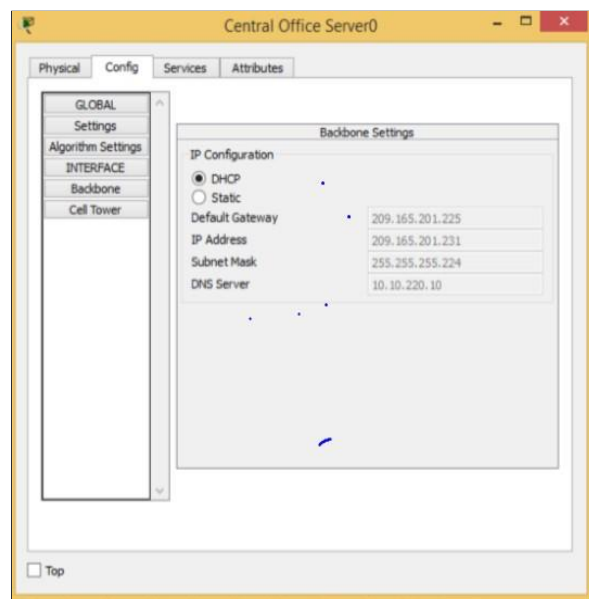

Fig 2 (b): Smart Home Architecture

3. IMPLEMENTATION

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Fig 3 (a): Smart Home Architecture

The above figure(3a) indicates the home architecture that uses wireless and wired media to connect to each other

Fig 3(b): The IP address is retrieved from the central

Incorrect information sent by a malfunctioning or attacker node might jeopardize the security and safety

Figure 3 (a) shows the total schematic architecture of the design model, whereas the Figures 2 (b), (c), (d) and (e) represents the screenshots of the Cisco packet tracer of implementation of Smart home and the various stages involved in it.

Office server

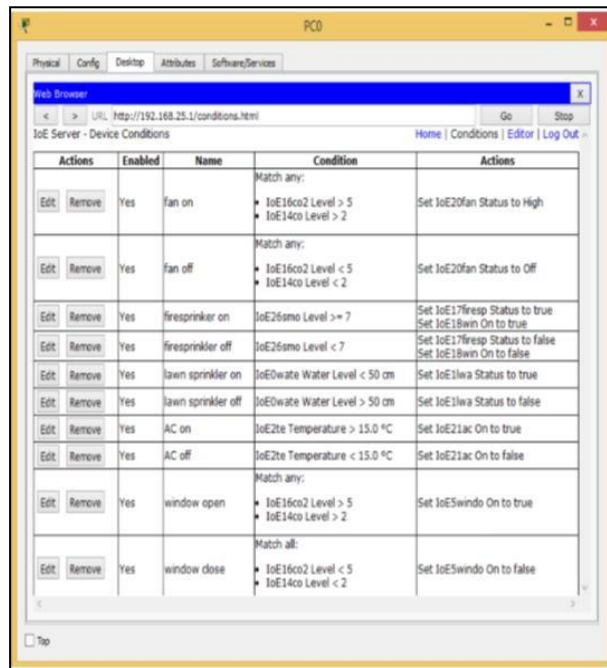of the vehicles and endangers another vehicle's
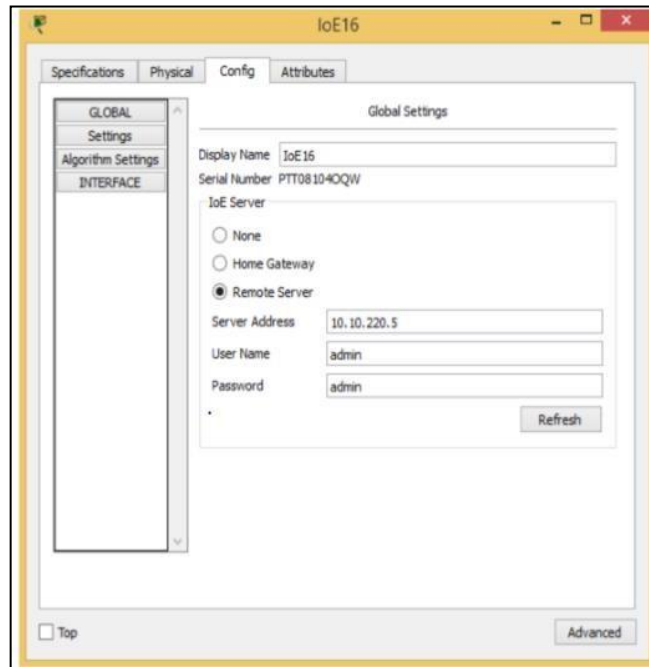
Fig 3 (c): *Home Gateway obtains Http ISP Database password*
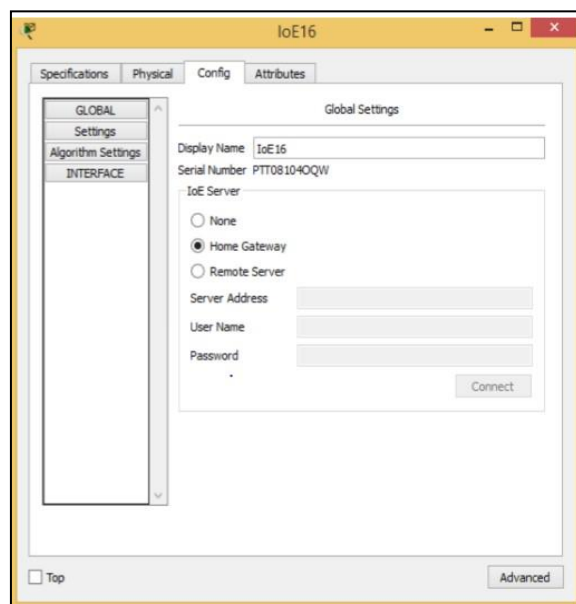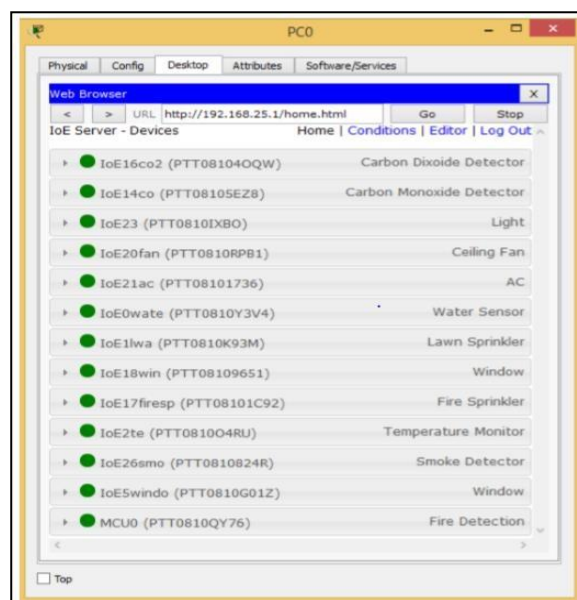

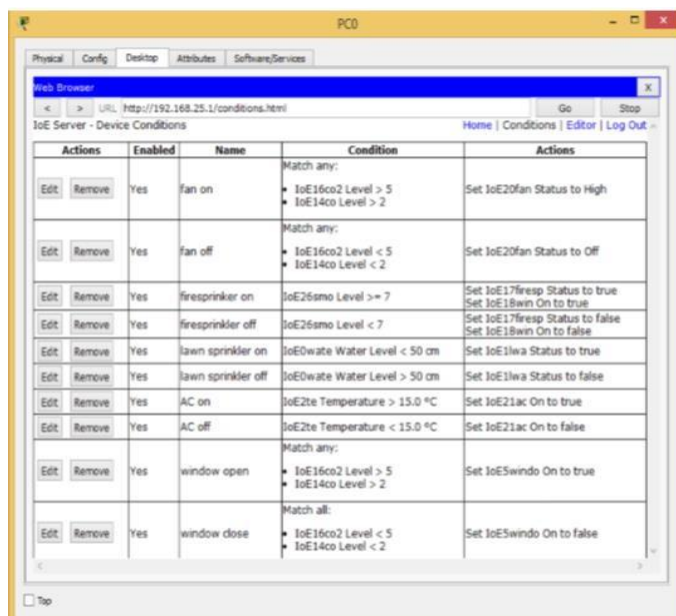**Fig 3 (d):** *IOE Database registration of IO devices(remote sensor)*

Fig 3(e): *IO devices registered in the Home Gateway*

Figure 3(e) indicates how IOE device can be registered to Gateway home. The home gateway has the default username and password for accessing the registered IOE device via the web.

**Fig 3(f):** *Registering Io devices to Home Gateway*

Fig 3(g): *Condition made to control the IOE device on the home gateway*

4. USED DEVICE FOR DESIGN

S. No	Devices	Functions
1	Router(1941)	Used to link home to the network of cellular.
2	Cable modem	Use to connect to the internet at home
3	Home gateway	Used to register smart objects and provide smart objects with IP addresses
4	IOE Server	To monitor intelligent things that are recorded on it and to have specific database features
5	Central office server	Used to link the router with the cellular network
6	MCU	Used to connect different intelligent things
7	PC	Link to your home destination to access intelligent objects
8	Fan	Used for ventilating the home environment on the basis of certain circumstances
9	Webcam	Control the home
10	Siren	Provide sound at home for some case
11	Light	Provide light
12	Motion detector	Link to your home getaway and detect motion
13	Smart door	Link to your home getaway and provide an event based on functions

| 14	Cell tower	Provide home user cellular network coverage to monitor the remote mode of the home appliance.
15	Tablet	Used to control the home from outside
16	CO detector	Used to detect CO of home
17	CO_2	Used to detect CO_2 of the home
18	Water level monitor	Used to monitor household water levels
19	Lawn sprinkler	Used as a sprinkler based on environmental water level
20	Smoke sensor	Used to sense the smoke level
21	Sound sensor	Used to sense the sound
22	Home speaker	The sound sensor is used to simulate the sound volume at 65
23	Temperature sensor	Used to sense the temperature of the home
24	Ceiling sprinkler	Used to ventilate home environment At a speed of 0.1 cm per second, water level affects.
25	Older car	Used to model various home development scenarios as it affects the amount of oil, co2 and smoke. At a level of 1 percent an hour, this absorbs carbon monoxide. At a level of 2 percent an hour, this absorbs carbon dioxide. Affects Smoke at an hourly rate of 3%.

5. RESULTS
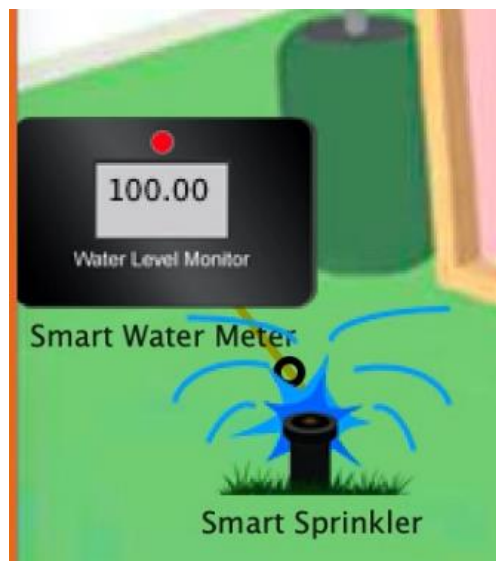
Fig 5(a): *Watering the plant by using the lawn sprinkler*

Figure 5a indicates that the lawn sprinkler is on, this can be based on a home gateway condition, and if applicable the lawn sprinkler on other off is more than 10 cm water level.

Figure 5(b) indicates that the window is close because the sound sensor detects it. When a speaker on a sound sensor senses the noise, I use a speaker to mimic the sound sensor and then close the window.
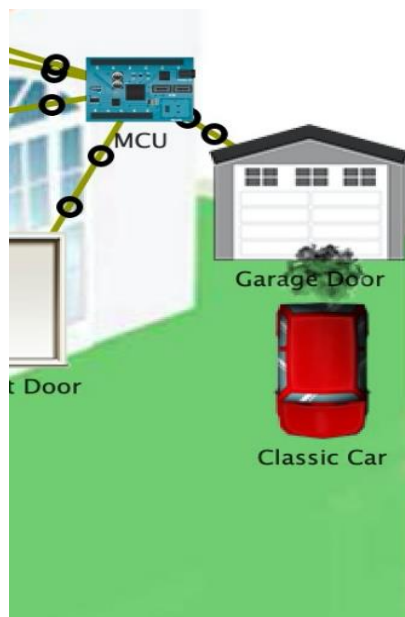
Fig 5(c): *when co and CO2 are detected to ventilate the place, the window and fan are open.*
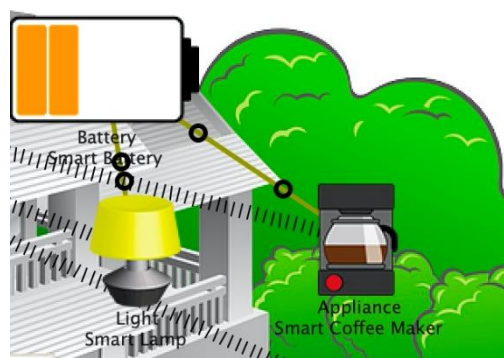

Fig 5(d) Smart Coffee maker preparing coffee

The figure 5b indicates by detecting carbon monoxide and carbon dioxide using a carbon monoxide and dioxide detector, the fan and window are opened. The old car is used for scenario testing because by increasing the co and co2 the old car is a lot of trouble.

Project Results

Fig 5(e) Wi-Fi Operated Wireless Bulb with Indicating LED. Bulb is off because it is powered off through Application.

Fig 5(f) Wi-fi operated bulb on with application used, Bulb is on after enabling the option from application and it is controlled by Microcontroller Unit.

6. CONCLUSION

In this article, We used the latest cisco packet tracer version to introduce smart home, as this version 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 moreover offers computing environment for different devices and different language of programming.

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