SMOKE DETECTION WITH FIRE PREVENTION

A COURSE PROJECT REPORT

By

DEBANJAN BASAK (RA2011003010606) (Team Lead)

MAYANK KUMAR (RA2011003010600)

SAI SHABARISH (RA2011003010592)

SAURABH DWIVEDI (RA2011003010595)

Under the guidance of

Madhavan P

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BONAFIDE CERTIFICATE

Certified that this mini project report "**SMOKE DETECTION WITH FIRE PREVENTION**" is the bonafide work of:

DEBANJAN BASAK (RA2011003010606) (Team Lead)

MAYANK KUMAR (RA2011003010600)

SAI SHABARISH (RA2011003010592)

SAURABH DWIVEDI (RA2011003010595)

who carried out the project work under my supervision.

SIGNATURE

Madhavan P

Associate Professor
C Tech
SRM Institute of Science and Technology

1. ABSTRACT

Environment has been deeply harmed by humans since a great deal of time, but with the technological advancements we can try and heal it. Detection of fire in homes is necessary to avoid destruction of property due to fire accidents both natural and induced.

Detection of fire can prove to be very important as it could mean the difference between life and death. Fires can occur from anywhere and at any point of time, hence the presence of Fire Alarm System helps in keeping your family safe. An automatic smoke detecting system will notify the individual as well as take necessary actions in the home in order to prevent the fire from spreading. It will help in detecting fire or smoke at an early stage and can help in saving lives. In our proposed system we are making use of Internet of Things as the technology and though a smoke sensor we will notify various home equipments to take appropriate actions in order to stop the fire from spreading.

The system is beneficial as it not just buzzes an alarm but also alerts the home appliances to do as they are needed.

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2. INTRODUCTION

A smoke detector is an electronic fire-protection device that automatically senses the presence of smoke, as a key indication of fire, and sounds a warning to building occupants.

Smoke alarms are a key part of a home fire escape plan. When there is a fire, smoke spreads fast. Working smoke alarms give you early warning so you can get outside quickly.

- A closed door may slow the spread of smoke, heat and fire. Install smoke alarms in every sleeping room and outside each separate sleeping area. Install alarms on every level of the home. Install alarms in the basement. Smoke alarms should be interconnected. When one sounds, they all sound.
- Large homes may need extra smoke alarms.
- It is best to use interconnected smoke alarms. When one smoke alarm sounds they all sound.
- Test all smoke alarms at least once a month. Press the test button to be sure the alarm is working.
- Today's smoke alarms will be more technologically advanced to respond to a multitude of fire conditions, yet mitigate false alarms.
- A smoke alarm should be on the ceiling or high on a wall. Keep smoke alarms away from the kitchen to reduce false alarms. They should be at least 10 feet (3 meters) from the stove.
- People who are hard-of-hearing or deaf can use special alarms. These alarms have strobe lights and bed shakers.
- Replace all smoke alarms when they are 10 years old.
- Smoke alarms are an important part of a home fire escape plan.

3. LITERATURE SURVEY

This paper discusses the automatic fire detection system, the composition and working principle.

The principle of the proposed circuit is derived from the physical principles of ionization. Fire detectors using two-wire method to reduce the wall alignment, improve reliability, and ease of construction and installation. This describes the overall structure of the fire detection system and control software in the design. Low cost fire detection and control system based on smoke and heat detection is proposed. It is comprised of a combination of electrical/electronic devices/equipment's working together to detect the presence of fire and alert people through audio or visual medium after detection.

These alarms may be activated from smoke detectors or heat detectors which, when detects fire.

Then, it automatically operates a relay which can be used to send Short Message Service (SMS) to the registered mobile numbers and switch on a water sprayer or a Solenoid Pump to spray water or fire ceasing foam. A Short Message Service (SMS) was used as a method of wireless connection in the designed system. The adopted (T-BoxN12R device) which was programed in Java to Micro Edition language (J2ME) will keep scanning the received gas smoke data signal from the Gas Smoke Sensor output to pre monitor the ability of occurrence of a fire, once it detects that the collected data (Gas Level) exceed a predefined threshold it will enable the communication with GSM network and send the ALARM SMS message to the predefined phone number. Also it will Turn Alarm Buzzer "ON", and Turn Water Pumping Motor "ON".

4.REQUIREMENTS

a. Requirement Analysis:

The project requires extensive use of Cisco Packet Tracer and other Cisco compatible software which may be used as and when required

These are required by us in order to demonstrate the working of the project.

The Cisco Packet Tracer pictorially represents the overall structure and other components which are used in the making of this project.

b. Hardware Requirement:

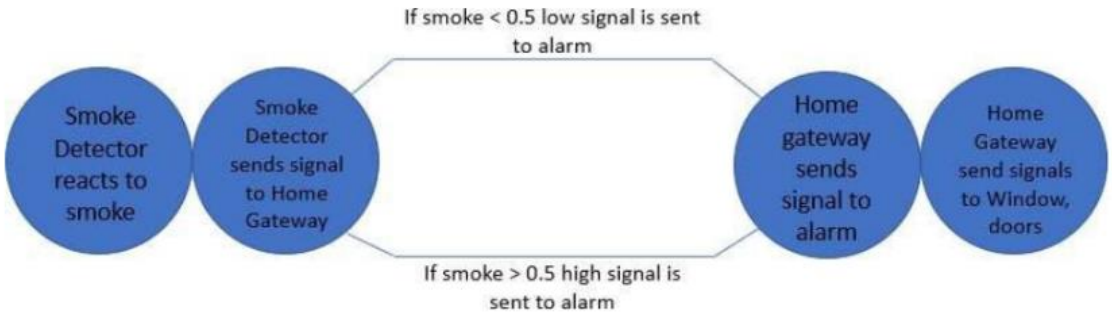
- ➔ Cisco Packet Tracer
- ➔ Laptop for execution

5. ARCHITECTURE AND DESIGN

a) Network Architecture

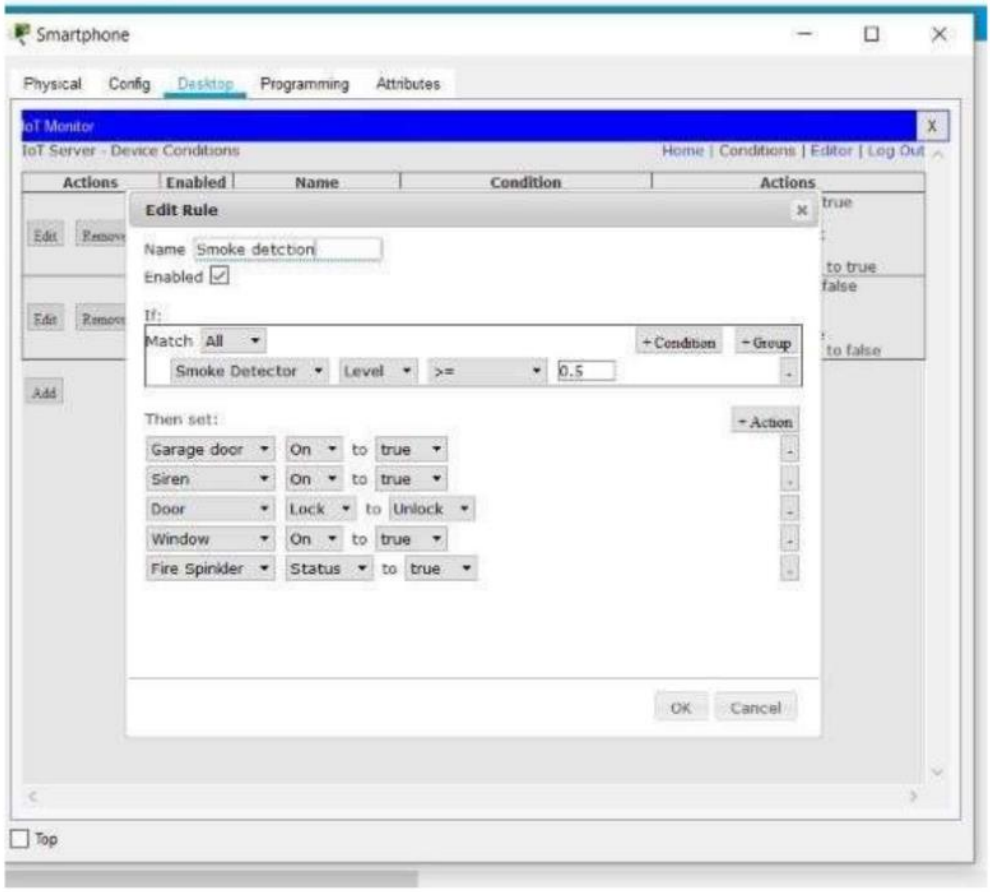
The network architecture is as follows:

5.1.1. Navigation

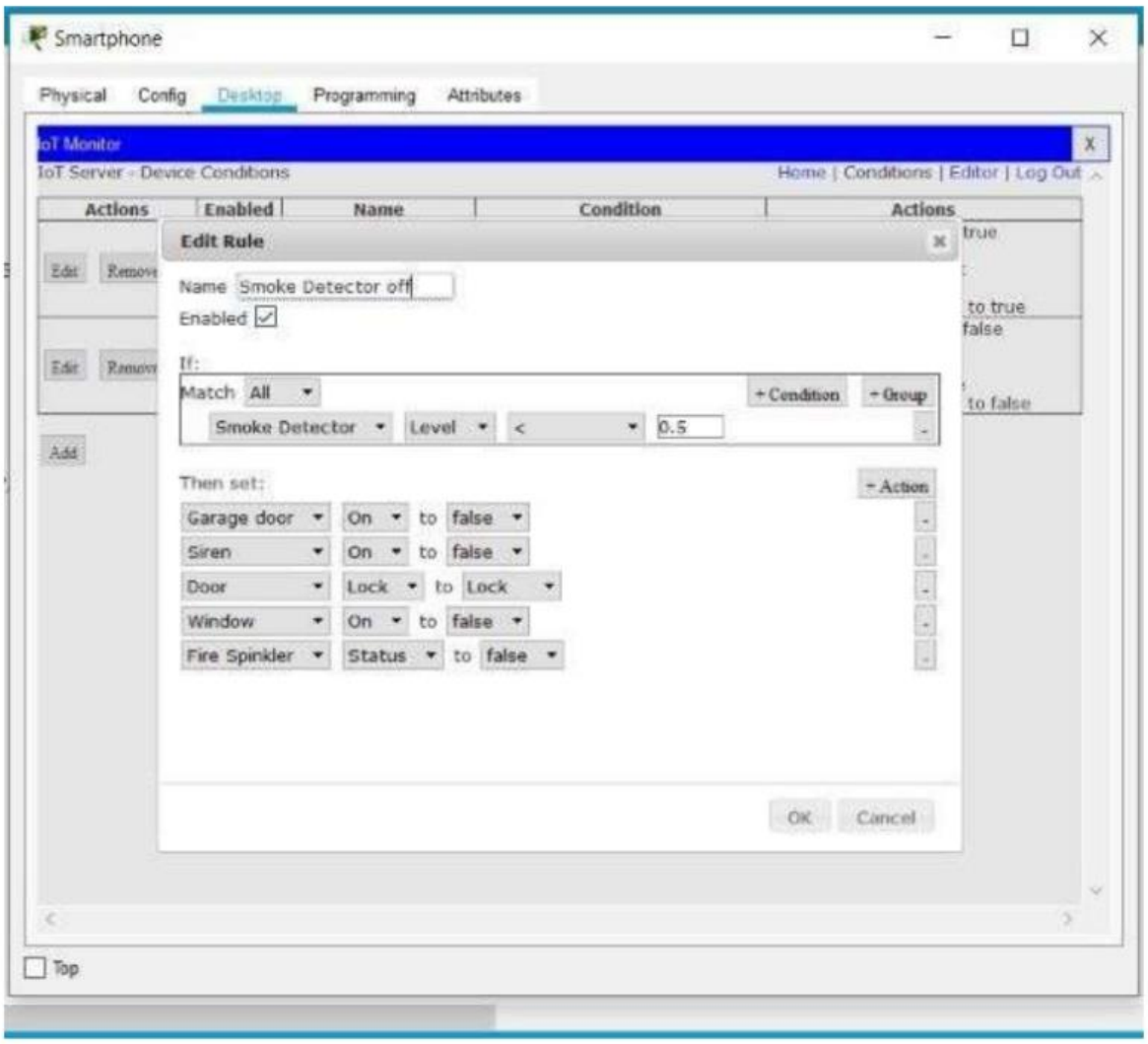


5.1.2 Smoke Detector On Rules

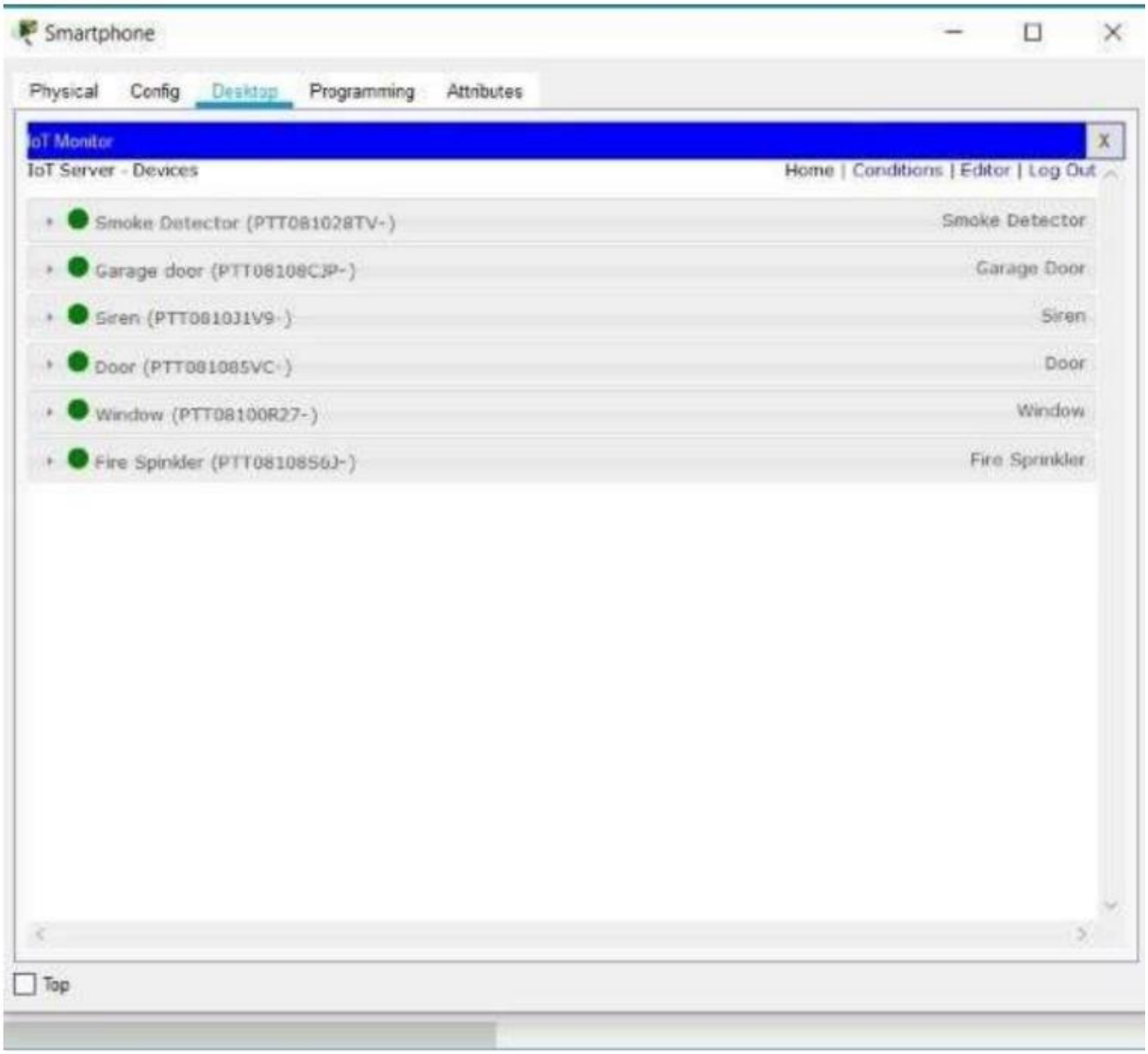
Page Layout



5.1.3 Smoke Detector Off rules



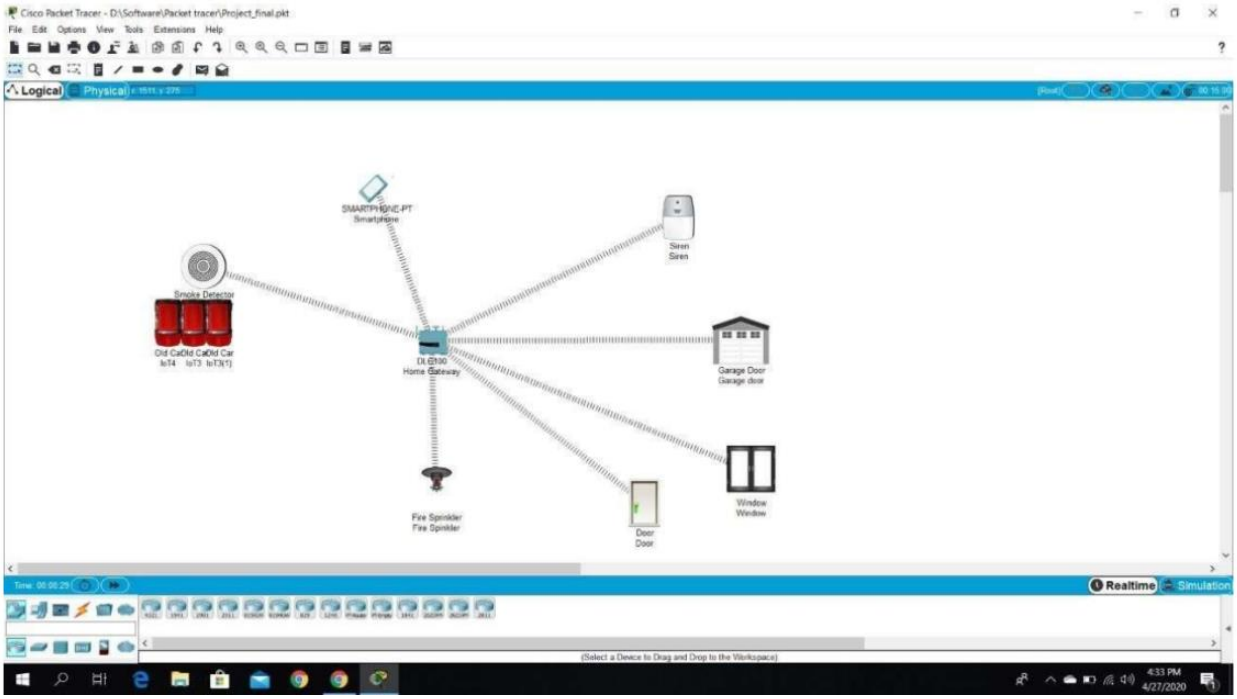
5.1.4 Devices in the system



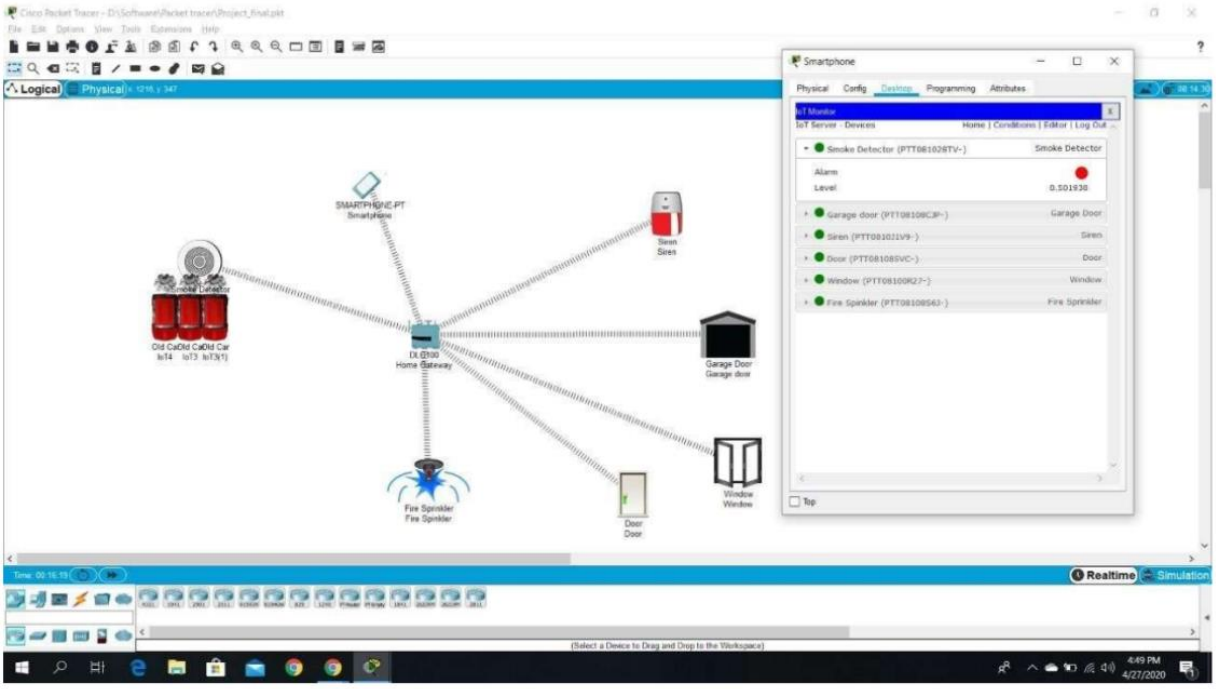
These networks are interconnected with each other with varying degrees (discussed in the implementation chapter).

6. IMPLEMENTATION

a. Network Design (Before)



b. Network Design (After)



Configuration:

1. DLC Home Gateway

• Created a web page with username and password to connect and gain control of the system.
• Registration can be done on this router.
• Range of the router is set to maximum (1000 meters or 1km).
• Ip address is assigned as 192.168.25.1 dynamically.

2. Smartphone

• Connect to the system by going to the web browser and entering the IP of the registration server and logging in using ID and Password.
• Ip address is assigned as 192.168.25.100 dynamically.

3. Smoke Detector

• Smoke Detector is used to detect any smoke. E.g. When a fire breaks out the smoke detector will detect it. And in our project when the smoke level goes beyond 0.5, certain conditions are triggered such as door, windows are opened and fire sprinkler and siren are turned on.
• It is connected to Home Gateway using advanced setting in I/O config i.e. (PT-IOT-NM-1W) network adapter setting.
• Dynamic IP address is assigned using DHCP.

4. Window

• A window is an opening in a wall that allows the passage of light, sound, and sometimes air.
• It is connected to Home Gateway using advanced setting in I/O config i.e (PT-IOT-NM-1W) network adapter setting
• Dynamic IP address is assigned using DHCP

5. Door

• A door is an opening from where people can enter or leave in a normal routine life as well as in emergency.
• It is connected to Home Gateway using advanced setting in I/O config i.e (PT-IOT-NM-1W) network adapter setting
• Dynamic IP address is assigned using DHCP

6. Garage door

• A Garage door is an opening from where vehicles can enter or leave. In our case this is very crucial as garage doors are huge and can help the air escape when there is a fire outbreak, releasing carbon dioxide and other
Smoke Detection and Fire Prevention gases into the air and helping any people to take clean air if they are stuck in the house.
• It is connected to Home Gateway using advanced setting in I/O config i.e. (PT-IOT-NM-1W) network adapter setting
• Dynamic IP address is assigned using DHCP

7. Fire sprinkler

• The fire sprinkler sprays streams of water to suppress or extinguish the fire when ordered by the home gateway. This happens when smoke detector detects smoke level more than 0.5.
• It is connected to Home Gateway using advanced setting in I/O config i.e (PT-IOT-NM-1W) network adapter setting
• Dynamic IP address is assigned using DHCP

8. Siren

• A siren is device which makes a loud emergency sound when the smoke detector detects smoke level greater than 0.5.
• It is connected to Home Gateway using advanced setting in I/O config i.e (PT-IOT-NM-1W) network adapter setting
• Dynamic IP address is assigned using DHCP

9. Car

• In Cisco-packet tracer there is no object or entity which can simulate the generation of smoke other than a car.
• So, we have used 3 cars to represent smoke generation which is similar to smoke generated during fire.

7. EXPERIMENT RESULT AND ANALYSIS

a. Conditions

To implement the project, we need to specify certain conditions on which all the devices can be activated and deactivated. Based on how and when these conditions change, there will be changes in the state of the devices. To simulate smoke, we have used 3 cars. The conditions which are mentioned above and are crucial for this simulation are as follows:

IoT Server - Device Conditions

Home | Conditions | Editor | Log Out

Actions	Enabled	Name	Condition	Actions
Edit Remove	Yes	Smoke detction	Smoke Detector Level >= 0.5	Set Garage door On to true Set Siren On to true Set Door Lock to Unlock Set Window On to true Set Fire Spinkler Status to true
Edit Remove	Yes	Smoke Detector off	Smoke Detector Level < 0.5	Set Garage door On to false Set Siren On to false Set Door Lock to Lock Set Window On to false Set Fire Spinkler Status to false

b. Testing:

Test Case no.	Test Case	Expected Output	Actual Output	Result
1	When smoke detector detects smoke level > 0.5	Door open, window open, garage door open, sprinkler on, siren on.	Door open, window open, garage door open, sprinkler on, siren on.	Pass
2	When smoke detector detects smoke level < 0.5	Door close, window close, garage door close, sprinkler off, siren off.	Door close, window close, garage door close, sprinkler off, siren off.	Pass

8. CONCLUSION AND FUTURE ENHANCEMENT

Hence , "**SMOKE DETECTION WITH FIRE PREVENTION"** has been successfully demonstrated with the use of Cisco Packet Tracer

This system can be of great in domestic as well as industrial settings to detect smoke and alert people on an impending fire since smoke is a precursor for fire, instead of relying on heat/temperature sensors which sounds alarm when the fire has already started. This can go a long way in helping to save human life.

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