CS 361 Computer Networks Lab

Assignment 10

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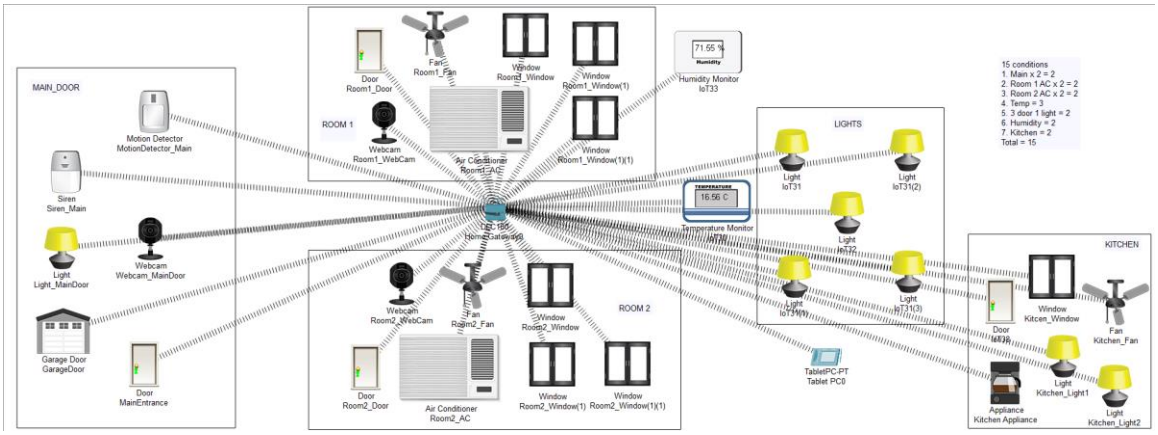
Questions:

Create an IOT environment where you need to connect your home gateway and connect a total of 10 IOT devices and create a total of 15 conditions where each condition should be affecting at least 5 IOT devices.

Network Diagram:

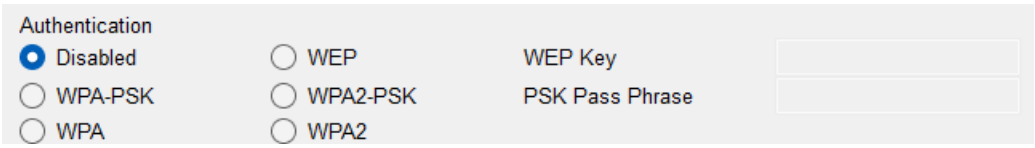


Total Appliances = 25. The network implemented shows two rooms and a kitchen, and basic IoT applications and how they can be interlinked with one another.

Steps:

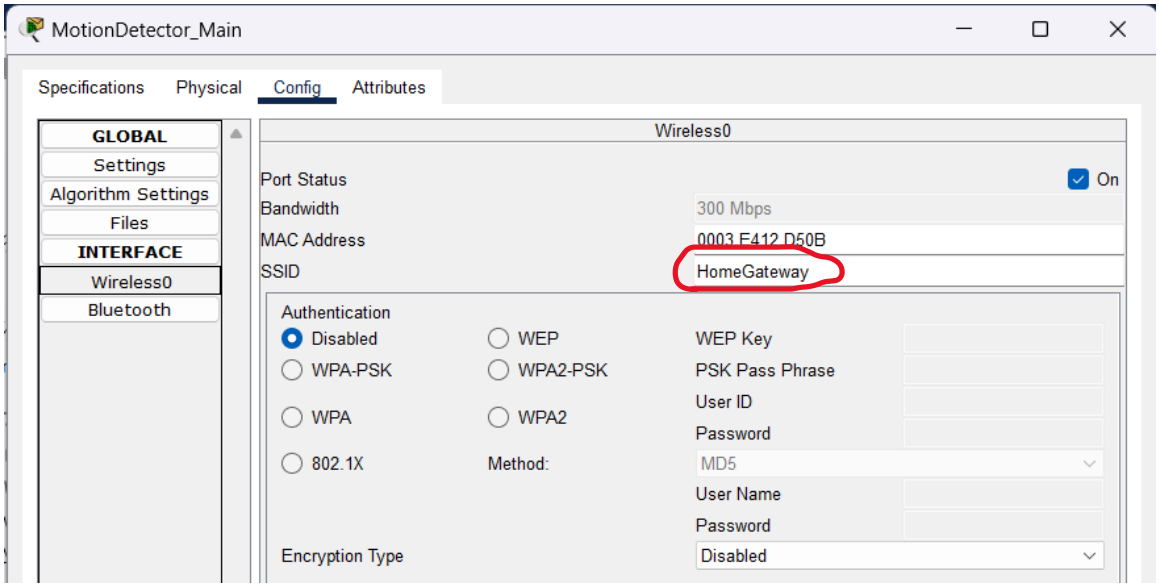
The wireless router used is Home Gateway.

The DLC 100 component is a wireless network device used to connect to various IoT devices, over a shorter range of distance. Although authentication can be added, for simplicity authentication has been disabled, so that all devices can connect easily.



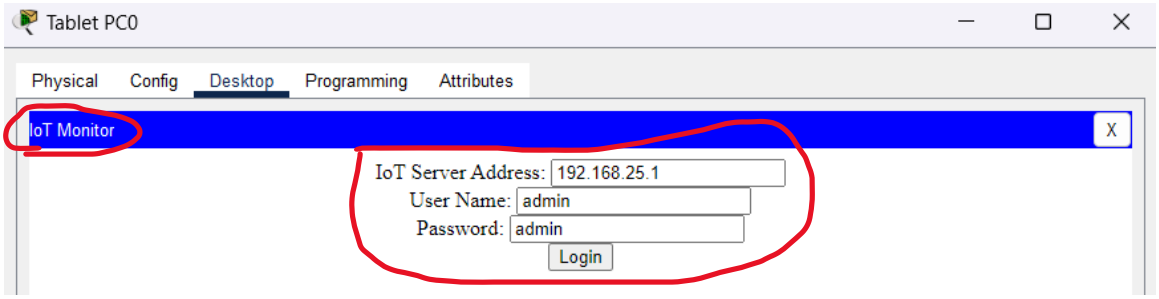
To connect an IoT device with it, we simply need to put SSID as "**HomeGateway**" and select **Remote server** as the IoT Server.

An example of the Motion Detection Device has been shown:

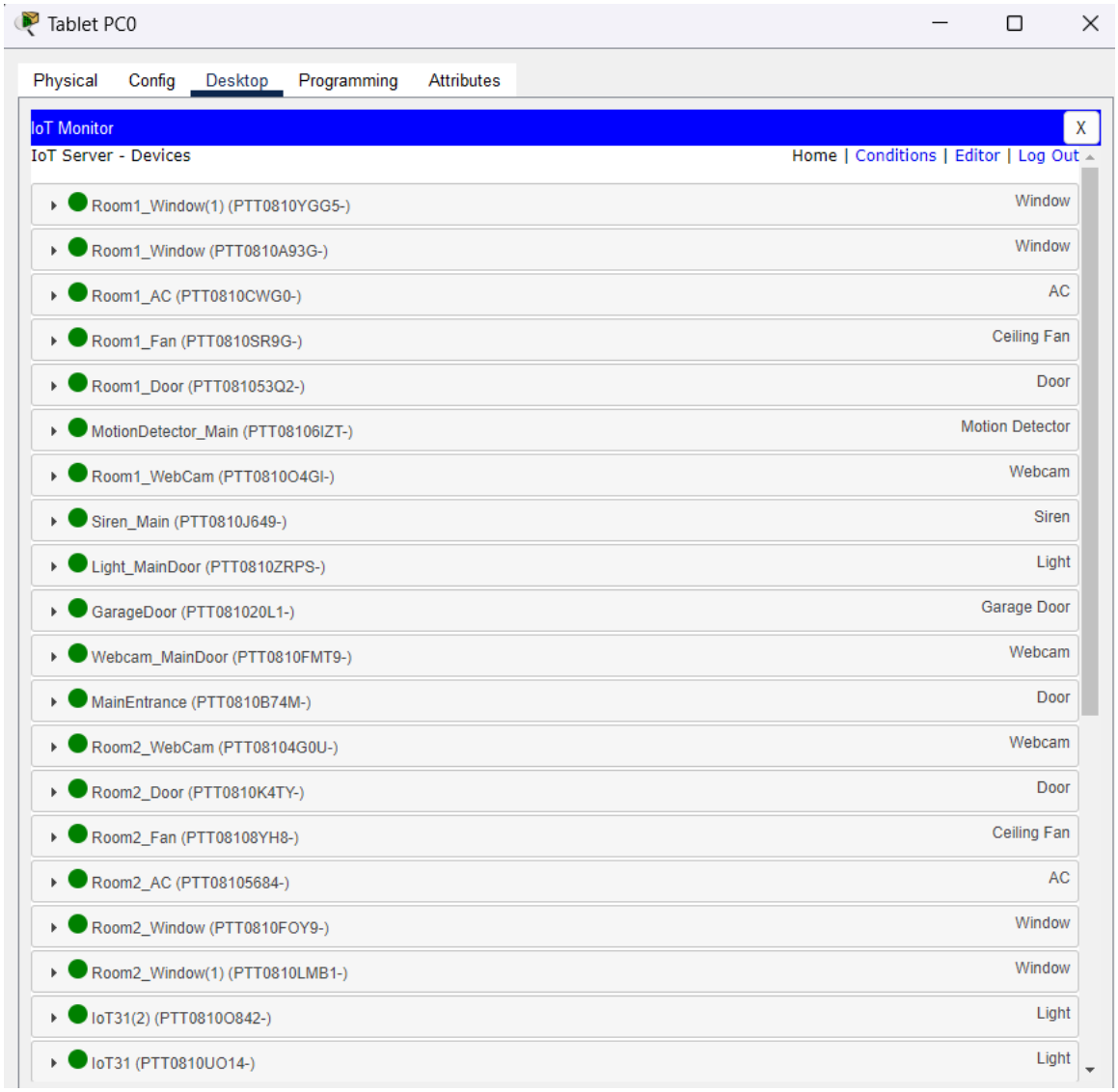


Now to control all the devices, we need an **IoT Monitor Application** that can be found in devices such as PCs, laptops, smartphones, and tablets. In the current example, a tablet has been used.

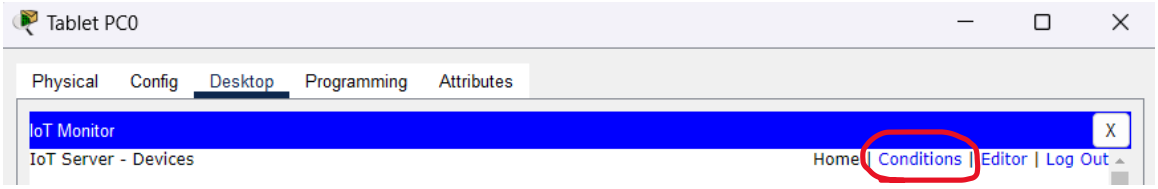
Following this, we need to login to the **IoT Monitor** with the default account and server address.

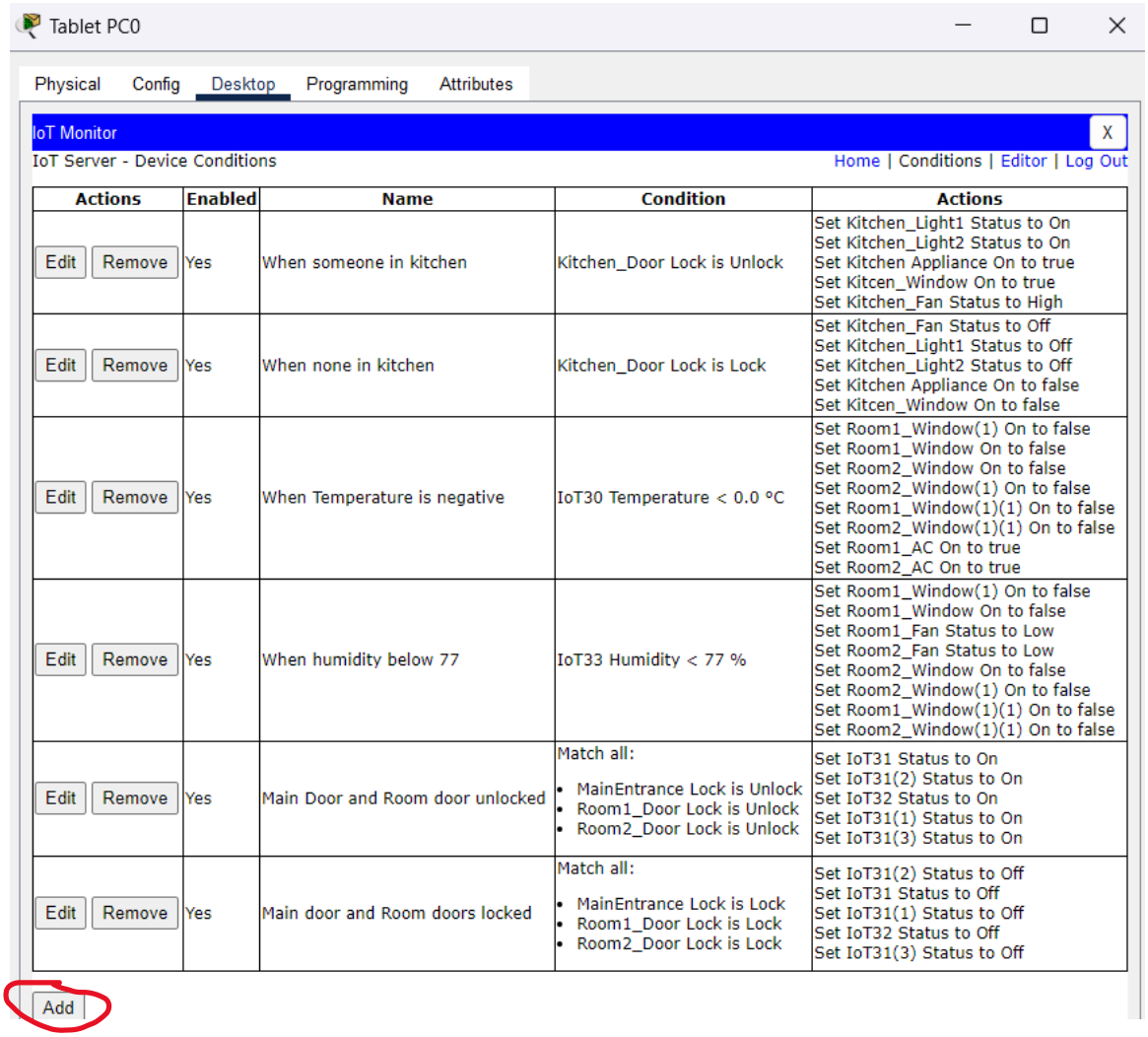


After login, all the devices connected to the HomeGateway is listed. The same can be used to control the devices as well.



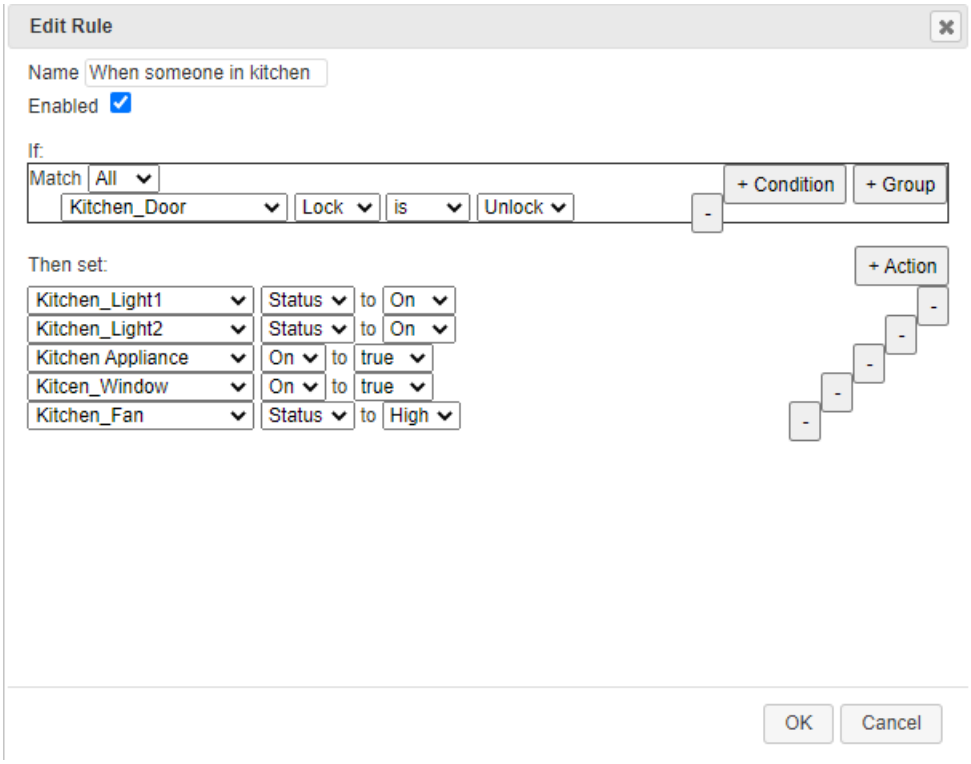
To link the functionality of an IoT device with that of an another, we need to go to the **Conditions tab,** which will list the conditions we have created, and an **Add** button to create new conditions.



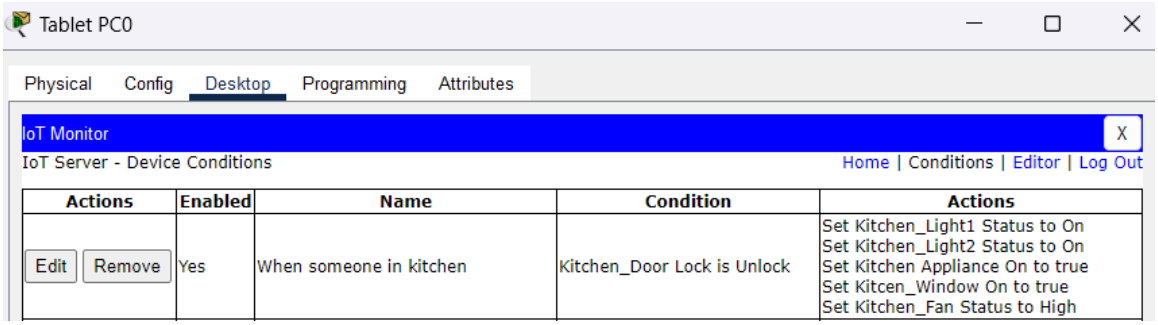


Actions	Enabled	Name	Condition	Actions
Edit Remove	Yes	When someone in kitchen	Kitchen_Door Lock is Unlock	Set Kitchen_Light1 Status to On Set Kitchen_Light2 Status to On Set Kitchen Appliance On to true Set Kitcen_Window On to true Set Kitchen_Fan Status to High
Edit Remove	Yes	When none in kitchen	Kitchen_Door Lock is Lock	Set Kitchen_Fan Status to Off Set Kitchen_Light1 Status to Off Set Kitchen_Light2 Status to Off Set Kitchen Appliance On to false Set Kitcen_Window On to false
Edit Remove	Yes	When Temperature is negative	IoT30 Temperature < 0.0 °C	Set Room1_Window(1) On to false Set Room1_Window On to false Set Room2_Window On to false Set Room2_Window(1) On to false Set Room1_Window(1)(1) On to false Set Room2_Window(1)(1) On to false Set Room1_AC On to true Set Room2_AC On to true
Edit Remove	Yes	When humidity below 77	IoT33 Humidity < 77 %	Set Room1_Window(1) On to false Set Room1_Window On to false Set Room1_Fan Status to Low Set Room2_Fan Status to Low Set Room2_Window On to false Set Room2_Window(1) On to false Set Room1_Window(1)(1) On to false Set Room2_Window(1)(1) On to false
Edit Remove	Yes	Main Door and Room door unlocked	Match all: • MainEntrance Lock is Unlock • Room1_Door Lock is Unlock • Room2_Door Lock is Unlock	Set IoT31 Status to On Set IoT31(2) Status to On Set IoT32 Status to On Set IoT31(1) Status to On Set IoT31(3) Status to On
Edit Remove	Yes	Main door and Room doors locked	Match all: • MainEntrance Lock is Lock • Room1_Door Lock is Lock • Room2_Door Lock is Lock	Set IoT31(2) Status to Off Set IoT31 Status to Off Set IoT31(1) Status to Off Set IoT32 Status to Off Set IoT31(3) Status to Off

On clicking the add button, the **Add Rule** tab opens, where we have to add the name of the rule, the condition ("**If" part)** and the effects ("**Then set" part)**.



After selecting the necessary functionalities, the **OK** button is clicked and we can see the rule listed.



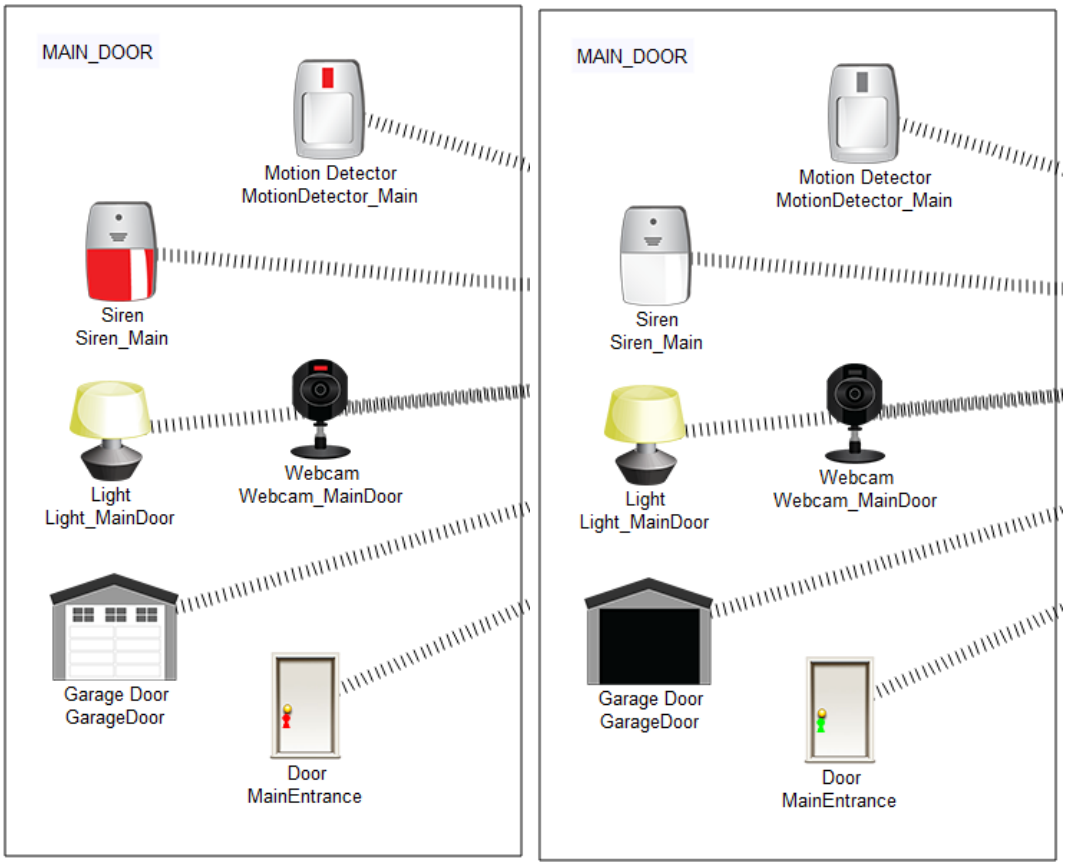
The next steps include adding all the conditions and the observed results.

Observations:

Condition 1 and 2:

Edit Remove	Yes	When Motion Detected	MotionDetector_Main On is true	Set Siren_Main On to true Set Light_MainDoor Status to On Set Webcam_MainDoor On to true Set MainEntrance Lock to Lock Set GarageDoor On to false
Edit Remove	Yes	When No Motion	MotionDetector_Main On is false	Set Siren_Main On to false Set Light_MainDoor Status to Dim Set Webcam_MainDoor On to false Set GarageDoor On to false Set MainEntrance Lock to Lock

Observation:

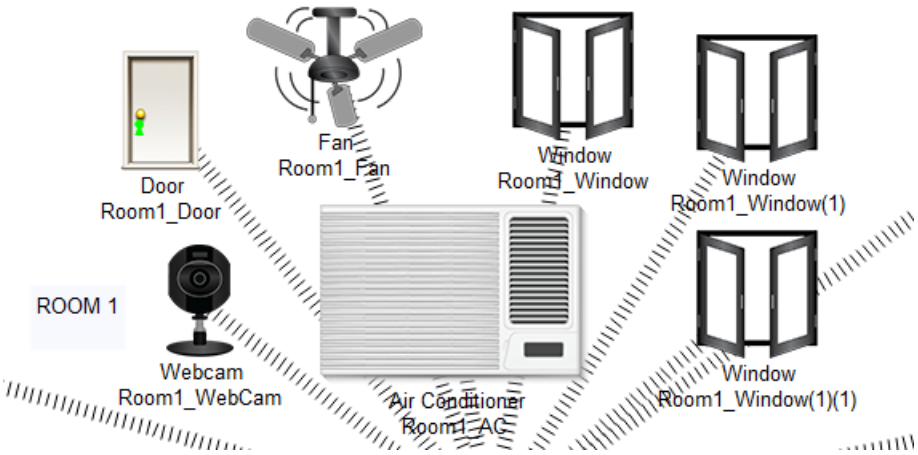


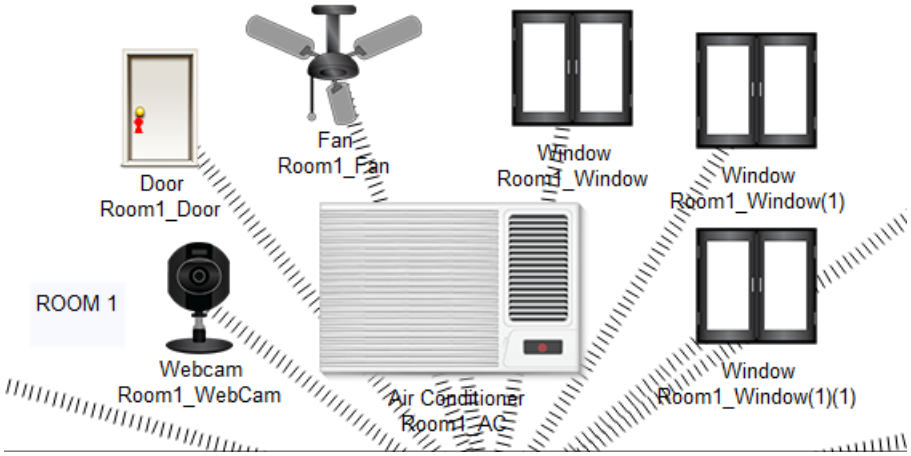
This condition switches on the webcam, siren, and main-door light, and locks the garage as well as the main door entrance, which can be implemented to protect the house from any intruder. (Left shows motion detected, and right shows no such situation).

Condition 3 and 4:

Edit Remove	Yes	When Room1 AC switched on	Room1_AC On is true	Set Room1_Fan Status to Off Set Room1_Window On to false Set Room1_Window On to false Set Room1_Door Lock to Lock Set Room1_Window(1)(1) On to false
Edit Remove	Yes	When Room1 AC is switched off	Room1_AC On is false	Set Room1_Window(1) On to true Set Room1_Window On to true Set Room1_Window(1)(1) On to true Set Room1_Door Lock to Unlock Set Room1_Fan Status to High

Observation:



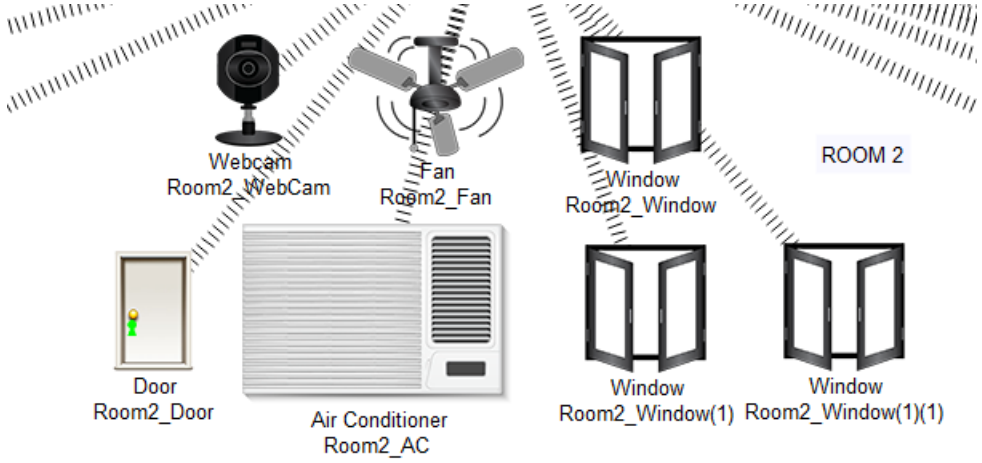


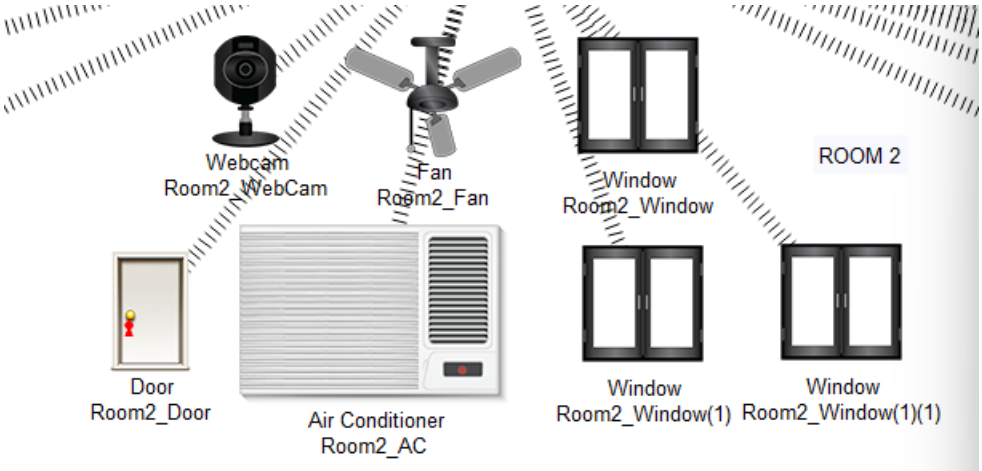
Both the conditions implement a basic functionality, like when the AC is switched on all windows, doors are closed, and fans are switched off. The opposite happens when the AC is switched off. (First pic shows AC switched off, and bottom one shows AC switched on).

Condition 5 and 6:

Edit Remove	Yes	When Room2 AC switched on	Room2_AC On is true	Set Room2_Fan Status to Off Set Room2_Window(1) On to false Set Room2_Window On to false Set Room2_Window(1)(1) On to false Set Room2_Door Lock to Lock
Edit Remove	Yes	When Room2 AC is switched off	Room2_AC On is false	Set Room2_Door Lock to Unlock Set Room2_Fan Status to High Set Room2_Window On to true Set Room2_Window(1) On to true Set Room2_Window(1)(1) On to true

Observation:



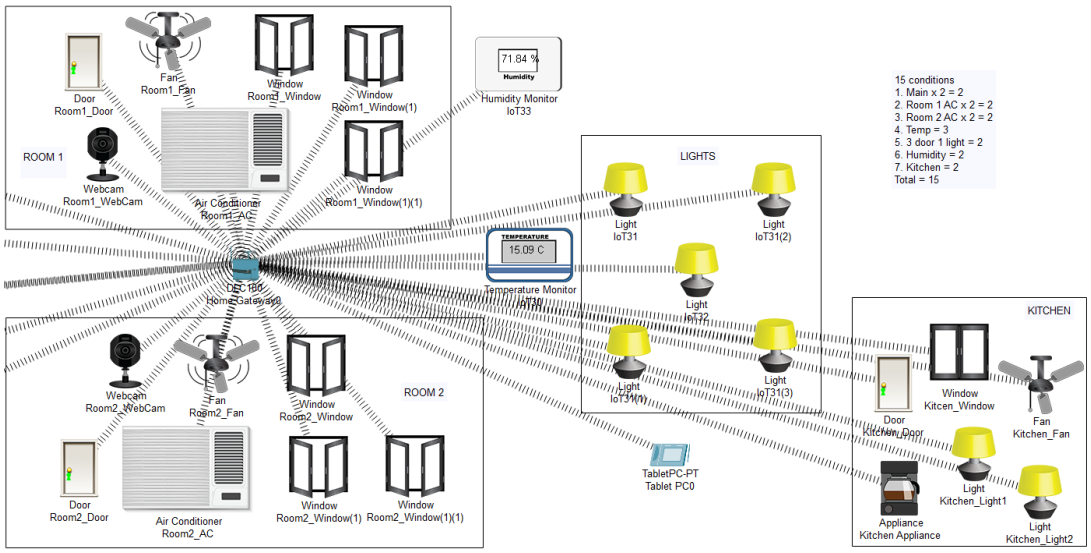


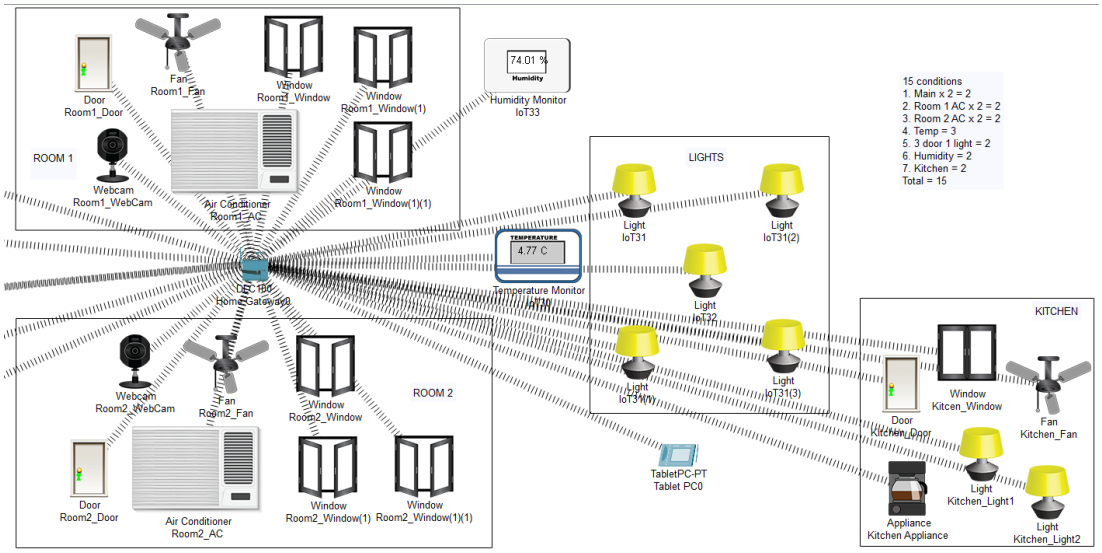
The previous conditionality has been implemented in another room (First pic shows AC switched off, and bottom one shows AC switched on).

Condition 7 and 8:

Edit Remove	Yes	When temperature below 8 C	IoT30 Temperature < 10.0 °C	Set Room1_AC On to false Set Room2_AC On to false Set Room1_Fan Status to Off Set Room2_Fan Status to Off Set Kitchen_Fan Status to Off

Observation:



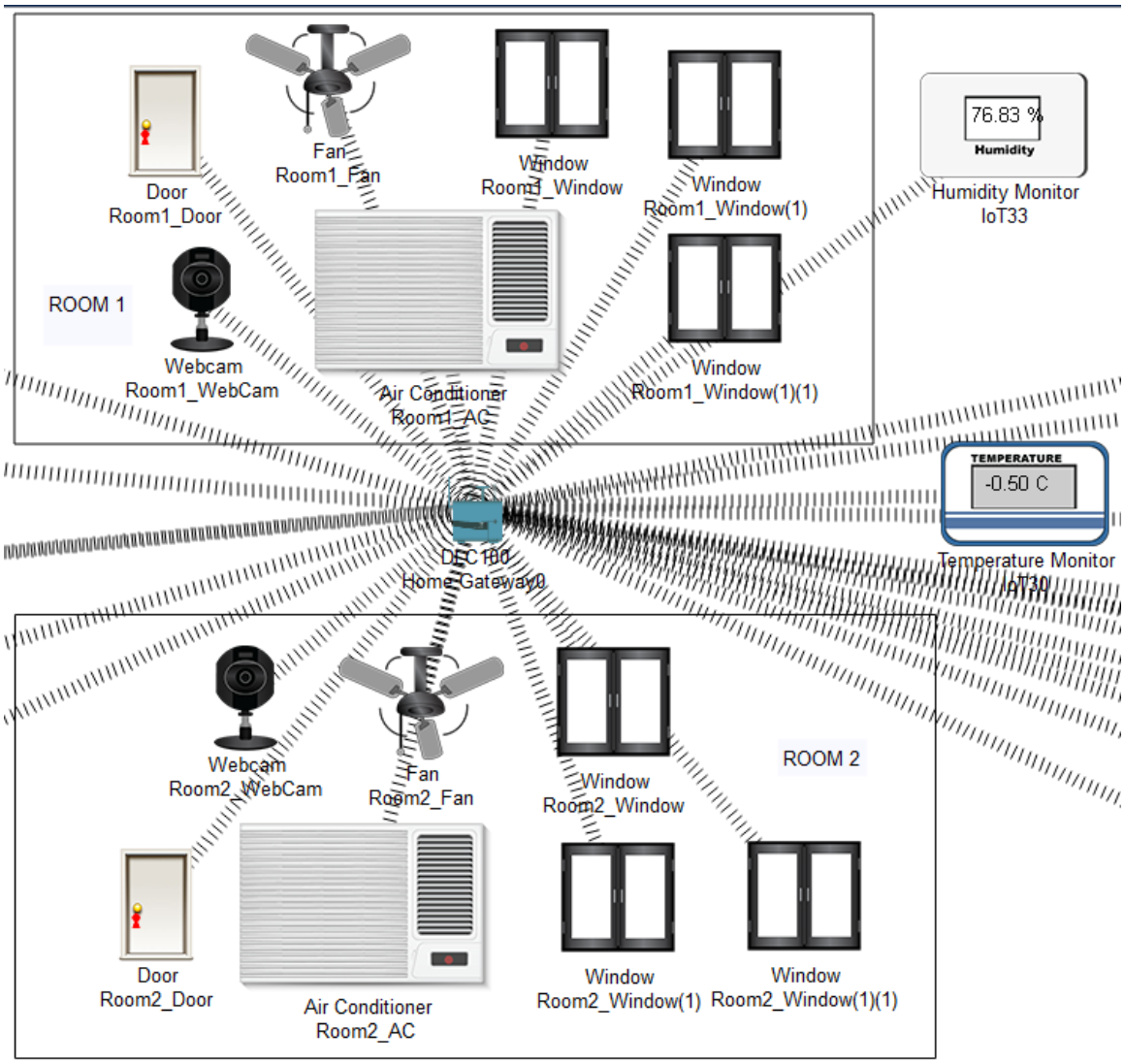


This implements a basic conditionality that when the temperature drops below 10 C, the AC's and the fans are switched off. (First image shows fans on in some rooms when temp > 10, and bottom image shows all fans and AC's off when temp < 10).

Condition 9:

Edit Remove	Yes	When Temperature is negative	IoT30 Temperature < 0.0 °C	Set Room1_Window(1) On to false Set Room1_Window On to false Set Room2_Window On to false Set Room2_Window(1) On to false Set Room1_Window(1)(1) On to false Set Room2_Window(1)(1) On to false Set Room1_AC On to true Set Room2_AC On to true

Observation:

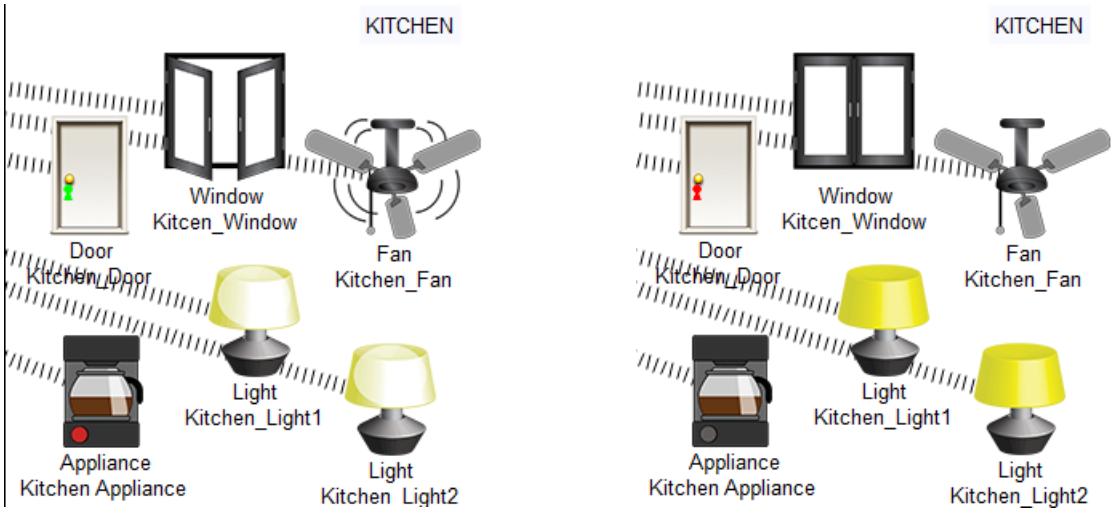


A conditionality implementing turning on of AC's once the temperature reaches negative degree, and closing of windows along with it.

Condition 10 and 11:

Edit Remove	Yes	When someone in kitchen	Kitchen_Door Lock is Unlock	Set Kitchen_Light1 Status to On Set Kitchen_Light2 Status to On Set Kitchen Appliance On to true Set Kitcen_Window On to true Set Kitchen_Fan Status to High
Edit Remove	Yes	When none in kitchen	Kitchen_Door Lock is Lock	Set Kitchen_Fan Status to Off Set Kitchen_Light1 Status to Off Set Kitchen_Light2 Status to Off Set Kitchen Appliance On to false Set Kitcen_Window On to false

Observation:

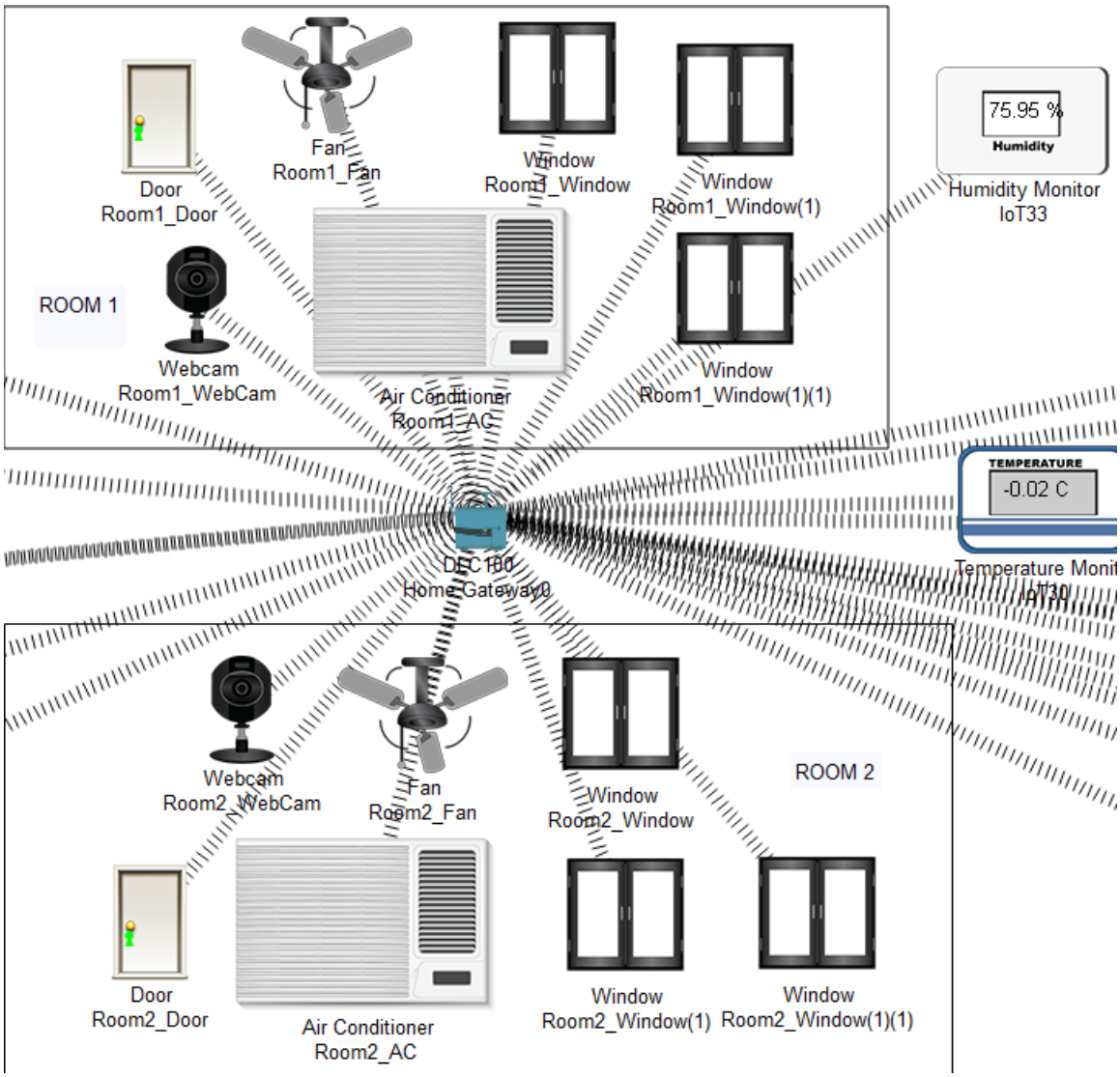


This implements a functionality where the kitchen lights, fans and appliances are switched on, and the windows opened when the kitchen door is open (indicating someone's presence), and the exact opposite when the door is locked (indicating someone's absence).

Condition 12:

Edit Remove	Yes	When humidity below 77	IoT33 Humidity < 77 %	Set Room1_Window(1) On to false Set Room1_Window On to false Set Room1_Fan Status to Low Set Room2_Fan Status to Low Set Room2_Window On to false Set Room2_Window(1) On to false Set Room1_Window(1)(1) On to false Set Room2_Window(1)(1) On to false

Observation:

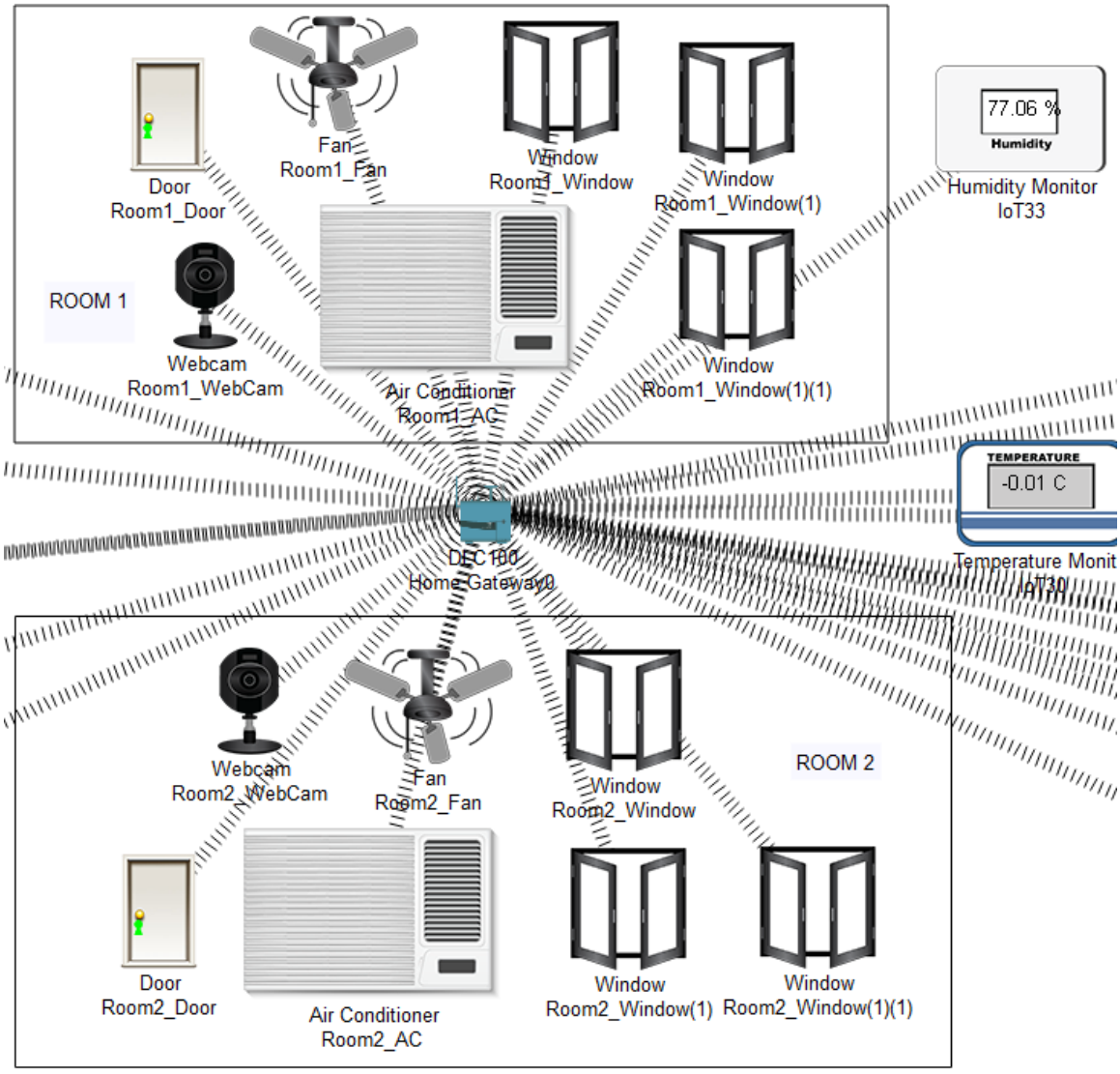


A situation to indicate that windows are closed, and fans are at a dim speed when the humidity inside a room is bearable (say <77%)

Condition 13:

Edit Remove	Yes	When Humidity above 77	IoT33 Humidity > 77 %	Set Room1_Window(1) On to true Set Room1_Window On to true Set Room2_Window On to true Set Room2_Window(1) On to true Set Room1_Window(1)(1) On to true Set Room2_Window(1)(1) On to true Set Room1_Fan Status to High Set Room2_Fan Status to High

Observation:

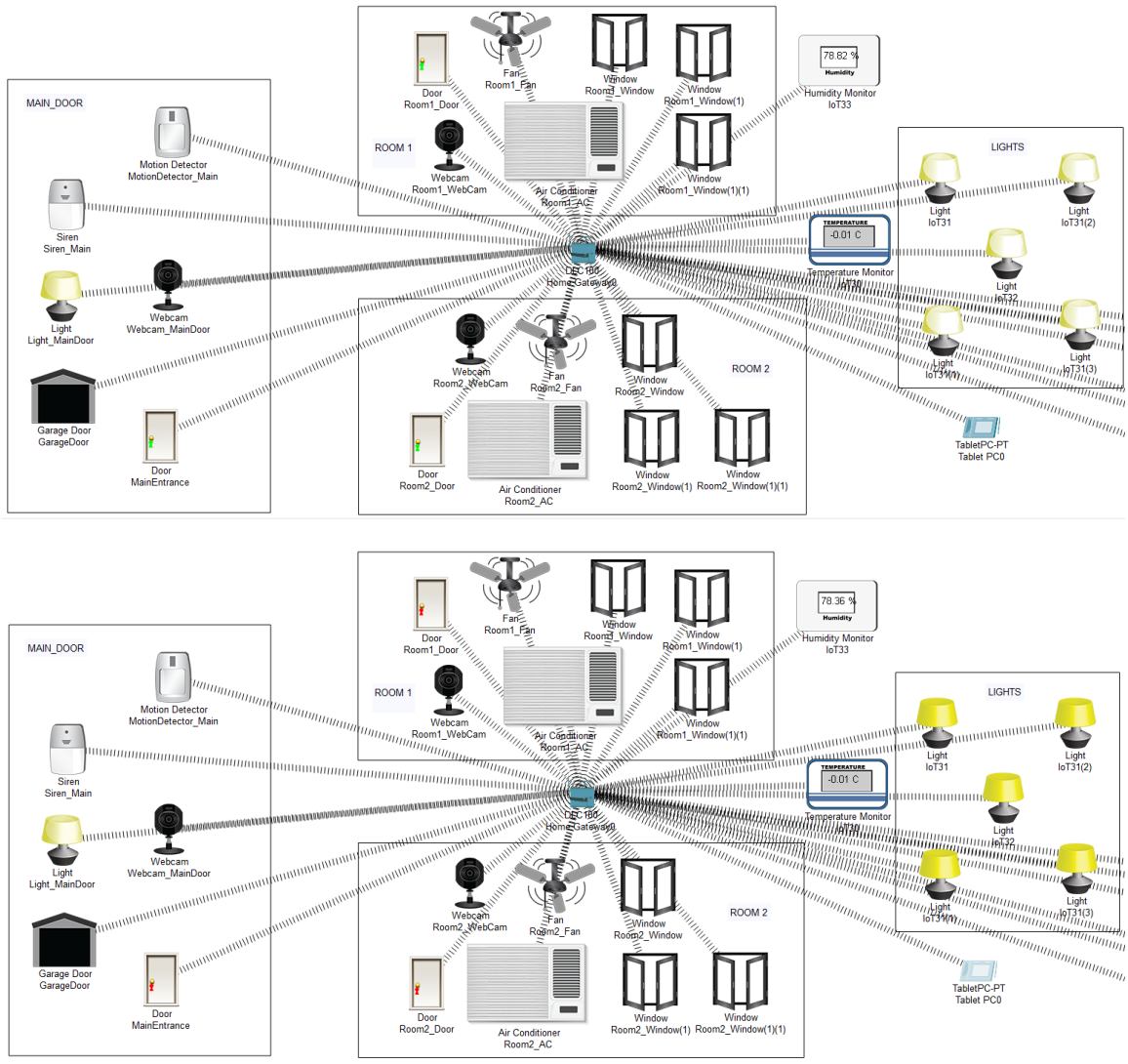


When humidity inside a room becomes unbearable (say >77%), windows need to be opened, and fans need to be switched on to let air flow and lower humidity. This implements the required functionality.

Condition 14 and 15:

Edit Remove	Yes	Main Door and Room door unlocked	Match all: • MainEntrance Lock is Unlock • Room1_Door Lock is Unlock • Room2_Door Lock is Unlock	Set IoT31 Status to On Set IoT31(2) Status to On Set IoT32 Status to On Set IoT31(1) Status to On Set IoT31(3) Status to On
Edit Remove	Yes	Main door and Room doors locked	Match all: • MainEntrance Lock is Lock • Room1_Door Lock is Lock • Room2_Door Lock is Lock	Set IoT31(2) Status to Off Set IoT31 Status to Off Set IoT31(1) Status to Off Set IoT32 Status to Off Set IoT31(3) Status to Off

Observation:



A basic functionality implementing that lights need to be switched off if all doors are closed (indicating no one is present), and ca be left switched on if one door is opened (indicating someone's presence).