

PYTHON ASSIGNMENT1

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Class Description

Device Class:

Description: The Device class serves as the base class for various smart devices and provides common functionality such as turning on/off and getting the status.

Attribute:

- device_id: A unique identifier for the device.
- device_type: Describes the type of the device.
- status: Represents the device's current status (on or off).

Methods:

- `__init__(self, device_id, device_type)`: Initializes a device with a given device_id and device_type, setting the initial status to off.
- `get_status(self)`: Returns the device's current status (True for on, False for off).
- `turn_on(self)`: Turns the device on, and records the timestamp when it was turned on.
- `turn_off(self)`: Turns the device off, and records the timestamp when it was turned off.

SmartLight Class (Inherits from Device):

Description: The SmartLight class represents a smart light device with the ability to control brightness and gradual dimming.

Attribute:

- brightness: The current brightness level of the light (0-100).
- duration_sec: The duration, in seconds, for the gradual dimming of the light.

Methods:

- `__init__(self, device_id)`: Initializes a smart light with a given `device_id`, sets the initial brightness to 0, and defines a duration for gradual dimming.
- `set_brightness(self, brightness)`: Sets the brightness of the light if it's turned on, or prints a message if the light is off.
- `gradual_dim(self)`: Gradually increases the brightness of the light over a specified duration if it's turned on, or prints a message if the light is off.

Thermostat Class (Inherits from Device):

Description: The Thermostat class represents a thermostat device that controls room temperature within a specified range.

Attribute:

- `temperature`: The current temperature setting of the thermostat (in Celsius).
- `max_limit`: The maximum temperature limit that can be set.
- `min_limit`: The minimum temperature limit that can be set.

Methods:

- `__init__(self, device_id)`: Initializes a thermostat with a given `device_id`, sets the default temperature, and defines temperature limits.
- `set_temperature(self, temperature)`: Sets the thermostat's temperature if it's turned on and within the specified limits, or prints a message if it's off or the temperature is beyond limits.
- `set_temperature_range(self, min_temperature, max_temperature)`: Sets the temperature range if the thermostat is turned on, or prints a message if it's off.
- `modify_properties(self, config_properties)`: Modifies thermostat properties, specifically the temperature range, based on a dictionary of configuration properties.

- `get_temperature(self)`: Returns the current temperature of the thermostat.

SecurityCamera Class (Inherits from Device):

Description: The SecurityCamera class represents a security camera device with recording and motion detection capabilities.

Methods:

- `__init__(self, device_id)`: Initializes a security camera with a given device_id, setting the initial security status to "Recording."
- `set_security_status(self)`: Toggles the security status between "Recording" and "Idle" if the camera is turned on, or prints a message if it's off.
- `get_security_status(self)`: Returns the current security status of the camera.

AutomationSystem Class:

Attributes:

- `devices`: A list to store instances of devices (e.g., SmartLight, Thermostat, SecurityCamera).

- `sensor_data`: A list to store sensor data (not used in the provided code).
- `config_properties`: Configuration properties for the automation system.
- `start_time`: The start time of the automation system.
- `captured_output`: A list to store the captured print output.
- `original_stdout`: Stores the original sys. stdout.

Methods:

- `__init__(self, config_properties)`: Initializes the AutomationSystem with configuration properties.
- `add_device(self, device)`: Adds a device to the devices list.
- `discover_device_by_id(self, device_id)`: Searches for a device in the devices list by its device_id.
- `execute_automation(self)`: Executes automation rules based on device types (e.g., activate lights when motion is detected).
- `execute_automation_dash(self)`: Executes an alternative automation scenario.

- `set_config_properties(self)`: Sets configuration properties for devices and logs updates.

SmartHomeGUI class:

Attributes:

- `self.root`: This attribute represents the main tkinter window (the root window) for the smart home GUI. It is initialized with the provided `root` parameter and serves as the parent window for all other GUI elements.
- `self.automationSystem`: This attribute is an instance of the `AutomationSystem` class, representing the central automation system that manages smart home devices. It is passed as a parameter to the `SmartHomeGUI` constructor, allowing the GUI to interact with and control the devices in the system.
- `self.automation_status`: This attribute represents the current automation status, which can be either "ON" or "OFF." It is used to keep track of whether the automation system is active.
- `self.brightness_value`: This is a `tk.DoubleVar` variable used to store the current brightness value of the living room light. It is linked to the brightness slider and allows for real-time updates of the brightness level.

- `self.console_text`: This is a `tk.Text` widget used for displaying log messages and redirecting the standard output (`stdout`) to the GUI. It shows messages related to device control and events.
- `self.automation_status_label`: This is a `tk.Label` widget that displays the current automation status ("Automation Status: ON" or "Automation Status: OFF").
- `self.toggle_automation_button`: This is a `tk.Button` widget used to toggle the automation system on and off. The text on this button changes between "ON" and "OFF" based on the current automation status.
- `self.device_status_box`: This is a `tk.Text` widget used to display the status of all smart home devices. It provides information about each device's status, such as whether it's on or off.
- `self.brightness_slider`: This is a `tk.Scale` widget that represents a slider for adjusting the brightness of a light in the living room.
- `self.current_brightness_label`: This is a `tk.Label` widget that displays the current brightness level of the living room light.

- `self.temperature_slider`: This is a `tk.Scale` widget that represents a slider for setting the desired temperature in the living room, typically used for the thermostat.
- `self.thermostat_info_label`: This is a `tk.Label` widget used to display information about the thermostat, including its device ID and current temperature.
- `self.security_camera_info_label`: This is a `tk.Label` widget that provides information about the front door security camera, such as its motion detection status.
- `self.security_camera_status_label`: This is a `tk.Label` widget that displays the motion detection status of the security camera.
- `self.security_camera_toggle_button`: This is a `tk.Button` widget used to toggle the status of the security camera on and off.
- `self.security_camera_motion_button`: This is a `tk.Button` widget that allows for simulating random motion detection events or non-detection events for the security camera.
- `self.automation_rule_label`: This is a `tk.Label` widget that describes the automation rule related to turning on lights when motion is detected and brightness events.

- `self.text_box`: This is a `tk.Text` widget used for logging messages and displaying a history of events. It allows the GUI to show information and updates related to device actions and events.

Method:

- `__init__(self, root, automationSystem)`: This is the constructor method for the `SmartHomeGUI` class. It initializes the GUI and sets up all the widgets, including labels, buttons, sliders, and text boxes. It also sets up event handlers for various controls and starts the automation loop to update device status and data.
- `update_data(self)`: This method simulates data updates for temperature, motion detection, and brightness. It updates the brightness label for the living room light and schedules the next data update after 5 seconds.
- `toggle_automation(self)`: This method toggles the automation status on and off. It updates the automation status label and the text on the automation button. If automation is turned on, it triggers the execution of automation rules and schedules the next automation update.
- `update_automation(self)`: This method continuously updates the automation system when it is active by executing automation rules and scheduling periodic updates.

- `update_device_status(self)`: This method updates the device status text box with the current status of all smart home devices. It clears the text box and inserts updated device status information.
- `update_light_brightness(self, event)`: This method is called when the brightness slider value changes. It sets the brightness of the living room light and updates the brightness label accordingly.
- `toggle_light(self)`: This method toggles the status of the living room light. It updates the device status and the text on the light toggle button.
- `toggle_thermostat(self)`: This method toggles the status of the thermostat and updates the device status and the text on the thermostat toggle button.
- `update_thermostat_temperature(self, event)`: This method is called when the temperature slider value changes. It sets the temperature of the thermostat and updates the thermostat information label.
- `toggle_security_camera(self)`: This method toggles the status of the security camera and updates the device status and the text on the camera toggle button.

- `toggle_security_camera_motion(self)`: This method simulates random motion detection events or non-detection events for the security camera. It updates the motion detection status label, the button text for motion detection, and logs the events.
- `update_log(self, message)`: This method updates the log text box with a log message and ensures that the latest log message is visible in the text box.

How to run the automation system

1. Save the Python code you provided to a file with a “.py” extension. For example, you can save it as `automation_simulation.py`.
2. Ensure you have the necessary dependencies installed. Using self-defined classes such as `SmartLight`, `Thermostat`, and `SecurityCamera` from the `IoT_Device_Emulation` module, make sure you have this module or package available in your Python environment. You may need to install it using pip or another package manager.
3. Create a directory where you want to store the simulation output data (e.g., sensor data). The sensor data is being written to a file named `sensor_data.txt`. Make sure you have this

directory created, or you can modify the code to specify a different file path if needed.

4. Open a terminal or command prompt.
5. Navigate to the directory where you saved the automation_simulation.py file and run the script using Python. You can use the following command:

```
python automation_simulation.py
```

or

```
python3 automation_simulation.py
```

1. The script will simulate a short duration (0.001 seconds) based on the configuration properties you specified in the config_properties dictionary. It will simulate changes in temperature, camera status, and light duration.
2. The simulation will generate logs in standard out and automatically store them in the sensor_data.txt file in the specified directory.

Instruction of the Smart Home Lot Simulator

Application Overview:

The Smart Home IoT Simulator is a graphical user interface (GUI) that emulates the operation of a smart home with various

devices such as lights, thermostats, and security cameras. You can interact with and control these devices to understand how they respond to automation and manual control.

1. Launch the Application:

- a. Run the Python script that contains the Smart Home IoT Simulator application.

2. Automation Control:

- a. At the top of the application window, you'll see an "Automation Status" label. It initially shows "ON."
- b. To toggle the automation system on or off, click the "Automation ON" button. Clicking it will switch between "ON" and "OFF."
- c. When the automation is turned on ("ON" is displayed), the system will automatically control the devices based on predefined rules.

3. Living Room Light Control:

- a. Below the automation controls, you'll find controls for the "Living Room Light."
- b. Use the "ON/OFF" button to toggle the light on and off.
- c. The brightness of the light can be adjusted using the slider below. Move the slider left (0) for minimum brightness or right (100) for maximum brightness.
- d. The current brightness percentage is displayed.

4. Living Room Thermostat Control:

- a. Below the light controls, you'll find controls for the "Living Room Thermostat."
- b. Use the "ON/OFF" button to toggle the thermostat on and off.
- c. Adjust the thermostat temperature by moving the temperature slider. The current temperature is displayed.

5. Front Door Camera Control:

- a. Below the thermostat controls, you'll find controls for the "Front Door Camera."
- b. Use the "ON/OFF" button to toggle the camera on and off.
- c. You can simulate motion detection by clicking the "Random Detection Motion" button. It will switch between "Random Detection Motion" and "Random Undetection Motion."

6. Automation Rules:

- a. The application follows predefined automation rules:
- b. When the camera detects motion, the Living Room Light turns on and gradually dims.
- c. You can view the automation status in the "Automation Status" label.

7. Device Status Display:

- a. The "Device Status" text box on the left side displays the current status of all devices in the simulation, including the "Living Room Light," "Living Room Thermostat," and "Front Door Camera."

8. Console Output:

- a. On the right side, there's a console output area where you can see logs and status updates from the simulation. This is where you can view messages related to device actions and automation.

9. Exit the Application:

- a. Close the application window to exit the Smart Home IoT Simulator.

10. Console Output File:

- a. The console output is also saved to a file named "sensor_data.txt" in the same directory as the script. You can check this file for logs and historical data.

Test cases:

In an automatic system, the config properties are randomly set such as the “temperature_range” sets the limit of fluctuation of temperature ($(6.0 \leq \text{min_limit} < 15.0) \vee (15.0 < \text{max_limit} \leq 30.0)$), The “camera_status” sets “recording” or “idle” the camera security status randomly and the “light_duration_sec” sets “duration_sec” randomly ($1 \leq \text{duration_sec} \leq 100$)

1. light activation test

I'd like to make sure that under any circumstances If the camera detects motion at some point, the light is gonna be activated and turn up to 100 percent. Let temperature range, camera_status, and duration_sec denoted by a, b, and c respectively.

a) $13.0 \leq a \leq 19.0$ b = “idle” c = 60.0

from line 9, when the camera detects motion, the light is activated to 100 percentage of brightness.

```
● 1 [2023-11-05 13:18:12] light001: turned on
  2 [2023-11-05 13:18:12] light001: light duration is set to 60 (sec)
  3 [2023-11-05 13:18:12] light001: turned off
  4 [2023-11-05 13:18:12] thermostat001: turned on
  5 [2023-11-05 13:18:12] thermostat001: range is set from 13°C to 19°C
  6 [2023-11-05 13:18:12] camera001: turned on
  7 [2023-11-05 13:18:12] camera001: status is set to idle (mode)
  8 [2023-11-05 13:18:12] thermostat001: temperature is set to 18 from 20.0
  9 [2023-11-05 13:18:12] camera001: detect motion
 10 [2023-11-05 13:18:12] light001: turned on
 11 [2023-11-05 13:18:12] light001: Current brightness: 1.67
 12 [2023-11-05 13:18:12] light001: Current brightness: 3.33
 13 [2023-11-05 13:18:12] light001: Current brightness: 5.00
 14 [2023-11-05 13:18:12] light001: Current brightness: 6.67
 15 [2023-11-05 13:18:12] light001: Current brightness: 8.33
 16 [2023-11-05 13:18:12] light001: Current brightness: 10.00
 17 [2023-11-05 13:18:12] light001: Current brightness: 11.67
 18 [2023-11-05 13:18:12] light001: Current brightness: 13.33
 19 [2023-11-05 13:18:12] light001: Current brightness: 15.00
 20 [2023-11-05 13:18:12] light001: Current brightness: 16.67
 21 [2023-11-05 13:18:12] light001: Current brightness: 18.33
 22 [2023-11-05 13:18:12] light001: Current brightness: 20.00
 23 [2023-11-05 13:18:12] light001: Current brightness: 21.67
 24 [2023-11-05 13:18:12] light001: Current brightness: 23.33
 25 [2023-11-05 13:18:12] light001: Current brightness: 25.00
 26 [2023-11-05 13:18:12] light001: Current brightness: 26.67
 27 [2023-11-05 13:18:12] light001: Current brightness: 28.33
 28 [2023-11-05 13:18:12] light001: Current brightness: 30.00
 29 [2023-11-05 13:18:12] light001: Current brightness: 31.67
 30 [2023-11-05 13:18:12] light001: Current brightness: 33.33
 31 [2023-11-05 13:18:12] light001: Current brightness: 35.00
 32 [2023-11-05 13:18:12] light001: Current brightness: 36.67
 33 [2023-11-05 13:18:12] light001: Current brightness: 38.33
 34 [2023-11-05 13:18:12] light001: Current brightness: 40.00
 35 [2023-11-05 13:18:12] light001: Current brightness: 41.67
 36 [2023-11-05 13:18:12] light001: Current brightness: 43.33
 37 [2023-11-05 13:18:12] light001: Current brightness: 45.00
```

```
38 [2023-11-05 13:18:12] light001: Current brightness: 46.67
39 [2023-11-05 13:18:12] light001: Current brightness: 48.33
40 [2023-11-05 13:18:12] light001: Current brightness: 50.00
41 [2023-11-05 13:18:12] light001: Current brightness: 51.67
42 [2023-11-05 13:18:12] light001: Current brightness: 53.33
43 [2023-11-05 13:18:12] light001: Current brightness: 55.00
44 [2023-11-05 13:18:12] light001: Current brightness: 56.67
45 [2023-11-05 13:18:12] light001: Current brightness: 58.33
46 [2023-11-05 13:18:12] light001: Current brightness: 60.00
47 [2023-11-05 13:18:12] light001: Current brightness: 61.67
48 [2023-11-05 13:18:12] light001: Current brightness: 63.33
49 [2023-11-05 13:18:12] light001: Current brightness: 65.00
50 [2023-11-05 13:18:12] light001: Current brightness: 66.67
51 [2023-11-05 13:18:12] light001: Current brightness: 68.33
52 [2023-11-05 13:18:12] light001: Current brightness: 70.00
53 [2023-11-05 13:18:12] light001: Current brightness: 71.67
54 [2023-11-05 13:18:12] light001: Current brightness: 73.33
55 [2023-11-05 13:18:12] light001: Current brightness: 75.00
56 [2023-11-05 13:18:12] light001: Current brightness: 76.67
57 [2023-11-05 13:18:12] light001: Current brightness: 78.33
58 [2023-11-05 13:18:12] light001: Current brightness: 80.00
59 [2023-11-05 13:18:12] light001: Current brightness: 81.67
60 [2023-11-05 13:18:12] light001: Current brightness: 83.33
61 [2023-11-05 13:18:12] light001: Current brightness: 85.00
62 [2023-11-05 13:18:12] light001: Current brightness: 86.67
63 [2023-11-05 13:18:12] light001: Current brightness: 88.33
64 [2023-11-05 13:18:12] light001: Current brightness: 90.00
65 [2023-11-05 13:18:12] light001: Current brightness: 91.67
66 [2023-11-05 13:18:12] light001: Current brightness: 93.33
67 [2023-11-05 13:18:12] light001: Current brightness: 95.00
68 [2023-11-05 13:18:12] light001: Current brightness: 96.67
69 [2023-11-05 13:18:12] light001: Current brightness: 98.33
70 [2023-11-05 13:18:12] light001: Current brightness: 100.00
```

b) $10.0 \leq a \leq 17.0$ b = “recording” c = 40.0

From line 79, when the camera detects motion, the light is activated to 100 percent of brightness.

```
72 [2023-11-05 13:18:12] light001: light duration is set to 40 (sec)
73 [2023-11-05 13:18:12] light001: turned off
74 [2023-11-05 13:18:12] thermostat001: turned on
75 [2023-11-05 13:18:12] thermostat001: range is set from 10°C to 17°C
76 [2023-11-05 13:18:12] camera001: turned on
77 [2023-11-05 13:18:12] camera001: status is set to recording (mode)
78 [2023-11-05 13:18:12] thermostat001: temperature is set to 14 from 20.0
79 [2023-11-05 13:18:12] camera001: detect motion
80 [2023-11-05 13:18:12] light001: turned on
81 [2023-11-05 13:18:12] light001: Current brightness: 2.50
82 [2023-11-05 13:18:12] light001: Current brightness: 5.00
83 [2023-11-05 13:18:12] light001: Current brightness: 7.50
84 [2023-11-05 13:18:12] light001: Current brightness: 10.00
85 [2023-11-05 13:18:12] light001: Current brightness: 12.50
86 [2023-11-05 13:18:12] light001: Current brightness: 15.00
87 [2023-11-05 13:18:12] light001: Current brightness: 17.50
88 [2023-11-05 13:18:12] light001: Current brightness: 20.00
89 [2023-11-05 13:18:12] light001: Current brightness: 22.50
90 [2023-11-05 13:18:12] light001: Current brightness: 25.00
91 [2023-11-05 13:18:12] light001: Current brightness: 27.50
92 [2023-11-05 13:18:12] light001: Current brightness: 30.00
93 [2023-11-05 13:18:12] light001: Current brightness: 32.50
94 [2023-11-05 13:18:12] light001: Current brightness: 35.00
95 [2023-11-05 13:18:12] light001: Current brightness: 37.50
96 [2023-11-05 13:18:12] light001: Current brightness: 40.00
97 [2023-11-05 13:18:12] light001: Current brightness: 42.50
98 [2023-11-05 13:18:12] light001: Current brightness: 45.00
99 [2023-11-05 13:18:12] light001: Current brightness: 47.50
100 [2023-11-05 13:18:12] light001: Current brightness: 50.00
101 [2023-11-05 13:18:12] light001: Current brightness: 52.50
102 [2023-11-05 13:18:12] light001: Current brightness: 55.00
103 [2023-11-05 13:18:12] light001: Current brightness: 57.50
104 [2023-11-05 13:18:12] light001: Current brightness: 60.00
105 [2023-11-05 13:18:12] light001: Current brightness: 62.50
106 [2023-11-05 13:18:12] light001: Current brightness: 65.00
107 [2023-11-05 13:18:12] light001: Current brightness: 67.50
108 [2023-11-05 13:18:12] light001: Current brightness: 70.00
```

```
109 [2023-11-05 13:18:12] light001: Current brightness: 72.50
110 [2023-11-05 13:18:12] light001: Current brightness: 75.00
111 [2023-11-05 13:18:12] light001: Current brightness: 77.50
112 [2023-11-05 13:18:12] light001: Current brightness: 80.00
113 [2023-11-05 13:18:12] light001: Current brightness: 82.50
114 [2023-11-05 13:18:12] light001: Current brightness: 85.00
115 [2023-11-05 13:18:12] light001: Current brightness: 87.50
116 [2023-11-05 13:18:12] light001: Current brightness: 90.00
117 [2023-11-05 13:18:12] light001: Current brightness: 92.50
118 [2023-11-05 13:18:12] light001: Current brightness: 95.00
119 [2023-11-05 13:18:12] light001: Current brightness: 97.50
120 [2023-11-05 13:18:12] light001: Current brightness: 100.00
```

c) $10.0 \leq a \leq 16.0$ b = “recording” c = 2.0

From line 121, when the camera detects motion, the light is activated to 100 percent

```
121 [2023-11-05 13:18:12] light001: turned on
122 [2023-11-05 13:18:12] light001: light duration is set to 2 (sec)
123 [2023-11-05 13:18:12] light001: turned off
124 [2023-11-05 13:18:12] thermostat001: turned on
125 [2023-11-05 13:18:12] thermostat001: range is set from 10°C to 16°C
126 [2023-11-05 13:18:12] camera001: turned on
127 [2023-11-05 13:18:12] camera001: status is set to recording (mode)
128 [2023-11-05 13:18:12] thermostat001: temperature is set to 14 from 20.0
129 [2023-11-05 13:18:12] camera001: detect motion
130 [2023-11-05 13:18:12] light001: turned on
131 [2023-11-05 13:18:12] light001: Current brightness: 50.00
132 [2023-11-05 13:18:12] light001: Current brightness: 100.00
```

Study light activation test summarizes what I could anticipate under determined circumstances, if the camera detects movement, light is automatically activated to 100 percent of brightness.

2. Light Deactivation Test

I'd like to make sure under any circumstances if the camera no longer detects motions, the light should be turned off.

a) $7.0 \leq a \leq 18.0$ b = "idle" c = 64.0

from lines 75, the condition is satisfied

```
1  [2023-11-06 14:41:45] light001: turned on
2  [2023-11-06 14:41:45] light001: light duration is set to 64 (sec)
3  [2023-11-06 14:41:45] light001: turned off
4  [2023-11-06 14:41:45] thermostat001: turned on
5  [2023-11-06 14:41:45] thermostat001: range is set from 7°C to 18°C
6  [2023-11-06 14:41:45] camera001: turned on
7  [2023-11-06 14:41:45] camera001: status is set to idle (mode)
8  [2023-11-06 14:41:45] thermostat001: temperature is beyond limits
9  [2023-11-06 14:41:45] camera001: detect motion
10 [2023-11-06 14:41:45] light001: turned on
11 [2023-11-06 14:41:45] light001: Current brightness: 1.56
12 [2023-11-06 14:41:45] light001: Current brightness: 3.12
13 [2023-11-06 14:41:45] light001: Current brightness: 4.69
14 [2023-11-06 14:41:45] light001: Current brightness: 6.25
15 [2023-11-06 14:41:45] light001: Current brightness: 7.81
16 [2023-11-06 14:41:45] light001: Current brightness: 9.38
17 [2023-11-06 14:41:45] light001: Current brightness: 10.94
18 [2023-11-06 14:41:45] light001: Current brightness: 12.50
19 [2023-11-06 14:41:45] light001: Current brightness: 14.06
20 [2023-11-06 14:41:45] light001: Current brightness: 15.62
21 [2023-11-06 14:41:45] light001: Current brightness: 17.19
22 [2023-11-06 14:41:45] light001: Current brightness: 18.75
23 [2023-11-06 14:41:45] light001: Current brightness: 20.31
24 [2023-11-06 14:41:45] light001: Current brightness: 21.88
25 [2023-11-06 14:41:45] light001: Current brightness: 23.44
26 [2023-11-06 14:41:45] light001: Current brightness: 25.00
27 [2023-11-06 14:41:45] light001: Current brightness: 26.56
28 [2023-11-06 14:41:45] light001: Current brightness: 28.12
29 [2023-11-06 14:41:45] light001: Current brightness: 29.69
30 [2023-11-06 14:41:45] light001: Current brightness: 31.25
31 [2023-11-06 14:41:45] light001: Current brightness: 32.81
32 [2023-11-06 14:41:45] light001: Current brightness: 34.38
33 [2023-11-06 14:41:45] light001: Current brightness: 35.94
34 [2023-11-06 14:41:45] light001: Current brightness: 37.50
35 [2023-11-06 14:41:45] light001: Current brightness: 39.06
36 [2023-11-06 14:41:45] light001: Current brightness: 40.62
37 [2023-11-06 14:41:45] light001: Current brightness: 42.19
```

```
38 [2023-11-06 14:41:45] light001: Current brightness: 43.75
39 [2023-11-06 14:41:45] light001: Current brightness: 45.31
40 [2023-11-06 14:41:45] light001: Current brightness: 46.88
41 [2023-11-06 14:41:45] light001: Current brightness: 48.44
42 [2023-11-06 14:41:45] light001: Current brightness: 50.00
43 [2023-11-06 14:41:45] light001: Current brightness: 51.56
44 [2023-11-06 14:41:45] light001: Current brightness: 53.12
45 [2023-11-06 14:41:45] light001: Current brightness: 54.69
46 [2023-11-06 14:41:45] light001: Current brightness: 56.25
47 [2023-11-06 14:41:45] light001: Current brightness: 57.81
48 [2023-11-06 14:41:45] light001: Current brightness: 59.38
49 [2023-11-06 14:41:45] light001: Current brightness: 60.94
50 [2023-11-06 14:41:45] light001: Current brightness: 62.50
51 [2023-11-06 14:41:45] light001: Current brightness: 64.06
52 [2023-11-06 14:41:45] light001: Current brightness: 65.62
53 [2023-11-06 14:41:45] light001: Current brightness: 67.19
54 [2023-11-06 14:41:45] light001: Current brightness: 68.75
55 [2023-11-06 14:41:45] light001: Current brightness: 70.31
56 [2023-11-06 14:41:45] light001: Current brightness: 71.88
57 [2023-11-06 14:41:45] light001: Current brightness: 73.44
58 [2023-11-06 14:41:45] light001: Current brightness: 75.00
59 [2023-11-06 14:41:45] light001: Current brightness: 76.56
60 [2023-11-06 14:41:45] light001: Current brightness: 78.12
61 [2023-11-06 14:41:45] light001: Current brightness: 79.69
62 [2023-11-06 14:41:45] light001: Current brightness: 81.25
63 [2023-11-06 14:41:45] light001: Current brightness: 82.81
64 [2023-11-06 14:41:45] light001: Current brightness: 84.38
65 [2023-11-06 14:41:45] light001: Current brightness: 85.94
66 [2023-11-06 14:41:45] light001: Current brightness: 87.50
67 [2023-11-06 14:41:45] light001: Current brightness: 89.06
68 [2023-11-06 14:41:45] light001: Current brightness: 90.62
69 [2023-11-06 14:41:45] light001: Current brightness: 92.19
70 [2023-11-06 14:41:45] light001: Current brightness: 93.75
71 [2023-11-06 14:41:45] light001: Current brightness: 95.31
72 [2023-11-06 14:41:45] light001: Current brightness: 96.88
73 [2023-11-06 14:41:45] light001: Current brightness: 98.44
74 [2023-11-06 14:41:45] light001: Current brightness: 100.00
75 [2023-11-06 14:41:45] camera001: not detect motion
76 [2023-11-06 14:41:45] light001: turned off
```

b) $11.0 \leq a \leq 27.0$ b = “recording” c = 86.0

By line 97, the condition is satisfied.

```
1 [2023-11-06 14:51:56] light001: turned on
2 [2023-11-06 14:51:56] light001: light duration is set to 86 (sec)
3 [2023-11-06 14:51:56] light001: turned off
4 [2023-11-06 14:51:56] thermostat001: turned on
5 [2023-11-06 14:51:56] thermostat001: range is set from 11°C to 27°C
6 [2023-11-06 14:51:56] camera001: turned on
7 [2023-11-06 14:51:56] camera001: status is set to recording (mode)
8 [2023-11-06 14:51:56] thermostat001: temperature is beyond limits
9 [2023-11-06 14:51:56] camera001: detect motion
10 [2023-11-06 14:51:56] light001: turned on
11 [2023-11-06 14:51:56] light001: Current brightness: 1.16
12 [2023-11-06 14:51:56] light001: Current brightness: 2.33
13 [2023-11-06 14:51:56] light001: Current brightness: 3.49
14 [2023-11-06 14:51:56] light001: Current brightness: 4.65
15 [2023-11-06 14:51:56] light001: Current brightness: 5.81
16 [2023-11-06 14:51:56] light001: Current brightness: 6.98
17 [2023-11-06 14:51:56] light001: Current brightness: 8.14
18 [2023-11-06 14:51:56] light001: Current brightness: 9.30
19 [2023-11-06 14:51:56] light001: Current brightness: 10.47
20 [2023-11-06 14:51:56] light001: Current brightness: 11.63
21 [2023-11-06 14:51:56] light001: Current brightness: 12.79
22 [2023-11-06 14:51:56] light001: Current brightness: 13.95
23 [2023-11-06 14:51:56] light001: Current brightness: 15.12
24 [2023-11-06 14:51:56] light001: Current brightness: 16.28
25 [2023-11-06 14:51:56] light001: Current brightness: 17.44
26 [2023-11-06 14:51:56] light001: Current brightness: 18.60
27 [2023-11-06 14:51:56] light001: Current brightness: 19.77
28 [2023-11-06 14:51:56] light001: Current brightness: 20.93
29 [2023-11-06 14:51:56] light001: Current brightness: 22.09
30 [2023-11-06 14:51:56] light001: Current brightness: 23.26
31 [2023-11-06 14:51:56] light001: Current brightness: 24.42
32 [2023-11-06 14:51:56] light001: Current brightness: 25.58
33 [2023-11-06 14:51:56] light001: Current brightness: 26.74
34 [2023-11-06 14:51:56] light001: Current brightness: 27.91
35 [2023-11-06 14:51:56] light001: Current brightness: 29.07
36 [2023-11-06 14:51:56] light001: Current brightness: 30.23
37 [2023-11-06 14:51:56] light001: Current brightness: 31.40
```

```
38 [2023-11-06 14:51:56] light001: Current brightness: 32.56
39 [2023-11-06 14:51:56] light001: Current brightness: 33.72
40 [2023-11-06 14:51:56] light001: Current brightness: 34.88
41 [2023-11-06 14:51:56] light001: Current brightness: 36.05
42 [2023-11-06 14:51:56] light001: Current brightness: 37.21
43 [2023-11-06 14:51:56] light001: Current brightness: 38.37
44 [2023-11-06 14:51:56] light001: Current brightness: 39.53
45 [2023-11-06 14:51:56] light001: Current brightness: 40.70
46 [2023-11-06 14:51:56] light001: Current brightness: 41.86
47 [2023-11-06 14:51:56] light001: Current brightness: 43.02
48 [2023-11-06 14:51:56] light001: Current brightness: 44.19
49 [2023-11-06 14:51:56] light001: Current brightness: 45.35
50 [2023-11-06 14:51:56] light001: Current brightness: 46.51
51 [2023-11-06 14:51:56] light001: Current brightness: 47.67
52 [2023-11-06 14:51:56] light001: Current brightness: 48.84
53 [2023-11-06 14:51:56] light001: Current brightness: 50.00
54 [2023-11-06 14:51:56] light001: Current brightness: 51.16
55 [2023-11-06 14:51:56] light001: Current brightness: 52.33
56 [2023-11-06 14:51:56] light001: Current brightness: 53.49
57 [2023-11-06 14:51:56] light001: Current brightness: 54.65
58 [2023-11-06 14:51:56] light001: Current brightness: 55.81
59 [2023-11-06 14:51:56] light001: Current brightness: 56.98
60 [2023-11-06 14:51:56] light001: Current brightness: 58.14
61 [2023-11-06 14:51:56] light001: Current brightness: 59.30
62 [2023-11-06 14:51:56] light001: Current brightness: 60.47
63 [2023-11-06 14:51:56] light001: Current brightness: 61.63
64 [2023-11-06 14:51:56] light001: Current brightness: 62.79
65 [2023-11-06 14:51:56] light001: Current brightness: 63.95
66 [2023-11-06 14:51:56] light001: Current brightness: 65.12
67 [2023-11-06 14:51:56] light001: Current brightness: 66.28
68 [2023-11-06 14:51:56] light001: Current brightness: 67.44
69 [2023-11-06 14:51:56] light001: Current brightness: 68.60
70 [2023-11-06 14:51:56] light001: Current brightness: 69.77
71 [2023-11-06 14:51:56] light001: Current brightness: 70.93
72 [2023-11-06 14:51:56] light001: Current brightness: 72.09
73 [2023-11-06 14:51:56] light001: Current brightness: 73.26
74 [2023-11-06 14:51:56] light001: Current brightness: 74.42
```

```
75 [2023-11-06 14:51:56] light001: Current brightness: 75.58
76 [2023-11-06 14:51:56] light001: Current brightness: 76.74
77 [2023-11-06 14:51:56] light001: Current brightness: 77.91
78 [2023-11-06 14:51:56] light001: Current brightness: 79.07
79 [2023-11-06 14:51:56] light001: Current brightness: 80.23
80 [2023-11-06 14:51:56] light001: Current brightness: 81.40
81 [2023-11-06 14:51:56] light001: Current brightness: 82.56
82 [2023-11-06 14:51:56] light001: Current brightness: 83.72
83 [2023-11-06 14:51:56] light001: Current brightness: 84.88
84 [2023-11-06 14:51:56] light001: Current brightness: 86.05
85 [2023-11-06 14:51:56] light001: Current brightness: 87.21
86 [2023-11-06 14:51:56] light001: Current brightness: 88.37
87 [2023-11-06 14:51:56] light001: Current brightness: 89.53
88 [2023-11-06 14:51:56] light001: Current brightness: 90.70
89 [2023-11-06 14:51:56] light001: Current brightness: 91.86
90 [2023-11-06 14:51:56] light001: Current brightness: 93.02
91 [2023-11-06 14:51:56] light001: Current brightness: 94.19
92 [2023-11-06 14:51:56] light001: Current brightness: 95.35
93 [2023-11-06 14:51:56] light001: Current brightness: 96.51
94 [2023-11-06 14:51:56] light001: Current brightness: 97.67
95 [2023-11-06 14:51:56] light001: Current brightness: 98.84
96 [2023-11-06 14:51:56] light001: Current brightness: 100.00
97 [2023-11-06 14:51:56] camera001: not detect motion
98 [2023-11-06 14:51:56] light001: turned off
99
```

c) $6.0 \leq a \leq 21.0$ b = “recording” c = 95.0

from line 97, the condition is satisfied.

```
1 [2023-11-06 14:56:26] light001: turned on
2 [2023-11-06 14:56:26] light001: light duration is set to 95 (sec)
3 [2023-11-06 14:56:26] light001: turned off
4 [2023-11-06 14:56:26] thermostat001: turned on
5 [2023-11-06 14:56:26] thermostat001: range is set from 6°C to 21°C
6 [2023-11-06 14:56:26] camera001: turned on
7 [2023-11-06 14:56:26] camera001: status is set to recording (mode)
8 [2023-11-06 14:56:26] thermostat001: temperature is set to 15 from 15.0
9 [2023-11-06 14:56:26] camera001: detect motion
10 [2023-11-06 14:56:26] light001: turned on
11 [2023-11-06 14:56:26] light001: Current brightness: 1.05
12 [2023-11-06 14:56:26] light001: Current brightness: 2.11
13 [2023-11-06 14:56:26] light001: Current brightness: 3.16
14 [2023-11-06 14:56:26] light001: Current brightness: 4.21
15 [2023-11-06 14:56:26] light001: Current brightness: 5.26
16 [2023-11-06 14:56:26] light001: Current brightness: 6.32
17 [2023-11-06 14:56:26] light001: Current brightness: 7.37
18 [2023-11-06 14:56:26] light001: Current brightness: 8.42
19 [2023-11-06 14:56:26] light001: Current brightness: 9.47
20 [2023-11-06 14:56:26] light001: Current brightness: 10.53
21 [2023-11-06 14:56:26] light001: Current brightness: 11.58
22 [2023-11-06 14:56:26] light001: Current brightness: 12.63
23 [2023-11-06 14:56:26] light001: Current brightness: 13.68
24 [2023-11-06 14:56:26] light001: Current brightness: 14.74
25 [2023-11-06 14:56:26] light001: Current brightness: 15.79
26 [2023-11-06 14:56:26] light001: Current brightness: 16.84
27 [2023-11-06 14:56:26] light001: Current brightness: 17.89
28 [2023-11-06 14:56:26] light001: Current brightness: 18.95
29 [2023-11-06 14:56:26] light001: Current brightness: 20.00
30 [2023-11-06 14:56:26] light001: Current brightness: 21.05
31 [2023-11-06 14:56:26] light001: Current brightness: 22.11
32 [2023-11-06 14:56:26] light001: Current brightness: 23.16
33 [2023-11-06 14:56:26] light001: Current brightness: 24.21
34 [2023-11-06 14:56:26] light001: Current brightness: 25.26
35 [2023-11-06 14:56:26] light001: Current brightness: 26.32
36 [2023-11-06 14:56:26] light001: Current brightness: 27.37
37 [2023-11-06 14:56:26] light001: Current brightness: 28.42
```

```
38 [2023-11-06 14:56:26] light001: Current brightness: 29.47
39 [2023-11-06 14:56:26] light001: Current brightness: 30.53
40 [2023-11-06 14:56:26] light001: Current brightness: 31.58
41 [2023-11-06 14:56:26] light001: Current brightness: 32.63
42 [2023-11-06 14:56:26] light001: Current brightness: 33.68
43 [2023-11-06 14:56:26] light001: Current brightness: 34.74
44 [2023-11-06 14:56:26] light001: Current brightness: 35.79
45 [2023-11-06 14:56:26] light001: Current brightness: 36.84
46 [2023-11-06 14:56:26] light001: Current brightness: 37.89
47 [2023-11-06 14:56:26] light001: Current brightness: 38.95
48 [2023-11-06 14:56:26] light001: Current brightness: 40.00
49 [2023-11-06 14:56:26] light001: Current brightness: 41.05
50 [2023-11-06 14:56:26] light001: Current brightness: 42.11
51 [2023-11-06 14:56:26] light001: Current brightness: 43.16
52 [2023-11-06 14:56:26] light001: Current brightness: 44.21
53 [2023-11-06 14:56:26] light001: Current brightness: 45.26
54 [2023-11-06 14:56:26] light001: Current brightness: 46.32
55 [2023-11-06 14:56:26] light001: Current brightness: 47.37
56 [2023-11-06 14:56:26] light001: Current brightness: 48.42
57 [2023-11-06 14:56:26] light001: Current brightness: 49.47
58 [2023-11-06 14:56:26] light001: Current brightness: 50.53
59 [2023-11-06 14:56:26] light001: Current brightness: 51.58
60 [2023-11-06 14:56:26] light001: Current brightness: 52.63
61 [2023-11-06 14:56:26] light001: Current brightness: 53.68
62 [2023-11-06 14:56:26] light001: Current brightness: 54.74
63 [2023-11-06 14:56:26] light001: Current brightness: 55.79
64 [2023-11-06 14:56:26] light001: Current brightness: 56.84
65 [2023-11-06 14:56:26] light001: Current brightness: 57.89
66 [2023-11-06 14:56:26] light001: Current brightness: 58.95
67 [2023-11-06 14:56:26] light001: Current brightness: 60.00
68 [2023-11-06 14:56:26] light001: Current brightness: 61.05
69 [2023-11-06 14:56:26] light001: Current brightness: 62.11
70 [2023-11-06 14:56:26] light001: Current brightness: 63.16
71 [2023-11-06 14:56:26] light001: Current brightness: 64.21
72 [2023-11-06 14:56:26] light001: Current brightness: 65.26
73 [2023-11-06 14:56:26] light001: Current brightness: 66.32
74 [2023-11-06 14:56:26] light001: Current brightness: 67.37
```

```
75 [2023-11-06 14:56:26] light001: Current brightness: 68.42
76 [2023-11-06 14:56:26] light001: Current brightness: 69.47
77 [2023-11-06 14:56:26] light001: Current brightness: 70.53
78 [2023-11-06 14:56:26] light001: Current brightness: 71.58
79 [2023-11-06 14:56:26] light001: Current brightness: 72.63
80 [2023-11-06 14:56:26] light001: Current brightness: 73.68
81 [2023-11-06 14:56:26] light001: Current brightness: 74.74
82 [2023-11-06 14:56:26] light001: Current brightness: 75.79
83 [2023-11-06 14:56:26] light001: Current brightness: 76.84
84 [2023-11-06 14:56:26] light001: Current brightness: 77.89
85 [2023-11-06 14:56:26] light001: Current brightness: 78.95
86 [2023-11-06 14:56:26] light001: Current brightness: 80.00
87 [2023-11-06 14:56:26] light001: Current brightness: 81.05
88 [2023-11-06 14:56:26] light001: Current brightness: 82.11
89 [2023-11-06 14:56:26] light001: Current brightness: 83.16
90 [2023-11-06 14:56:26] light001: Current brightness: 84.21
91 [2023-11-06 14:56:26] light001: Current brightness: 85.26
92 [2023-11-06 14:56:26] light001: Current brightness: 86.32
93 [2023-11-06 14:56:26] light001: Current brightness: 87.37
94 [2023-11-06 14:56:26] light001: Current brightness: 88.42
95 [2023-11-06 14:56:26] light001: Current brightness: 89.47
96 [2023-11-06 14:56:26] light001: Current brightness: 90.53
97 [2023-11-06 14:56:26] light001: Current brightness: 91.58
98 [2023-11-06 14:56:26] light001: Current brightness: 92.63
99 [2023-11-06 14:56:26] light001: Current brightness: 93.68
100 [2023-11-06 14:56:26] light001: Current brightness: 94.74
101 [2023-11-06 14:56:26] light001: Current brightness: 95.79
102 [2023-11-06 14:56:26] light001: Current brightness: 96.84
103 [2023-11-06 14:56:26] light001: Current brightness: 97.89
104 [2023-11-06 14:56:26] light001: Current brightness: 98.95
105 [2023-11-06 14:56:26] light001: Current brightness: 100.00
106 [2023-11-06 14:56:26] camera001: not detect motion
107 [2023-11-06 14:56:26] light001: turned off
```

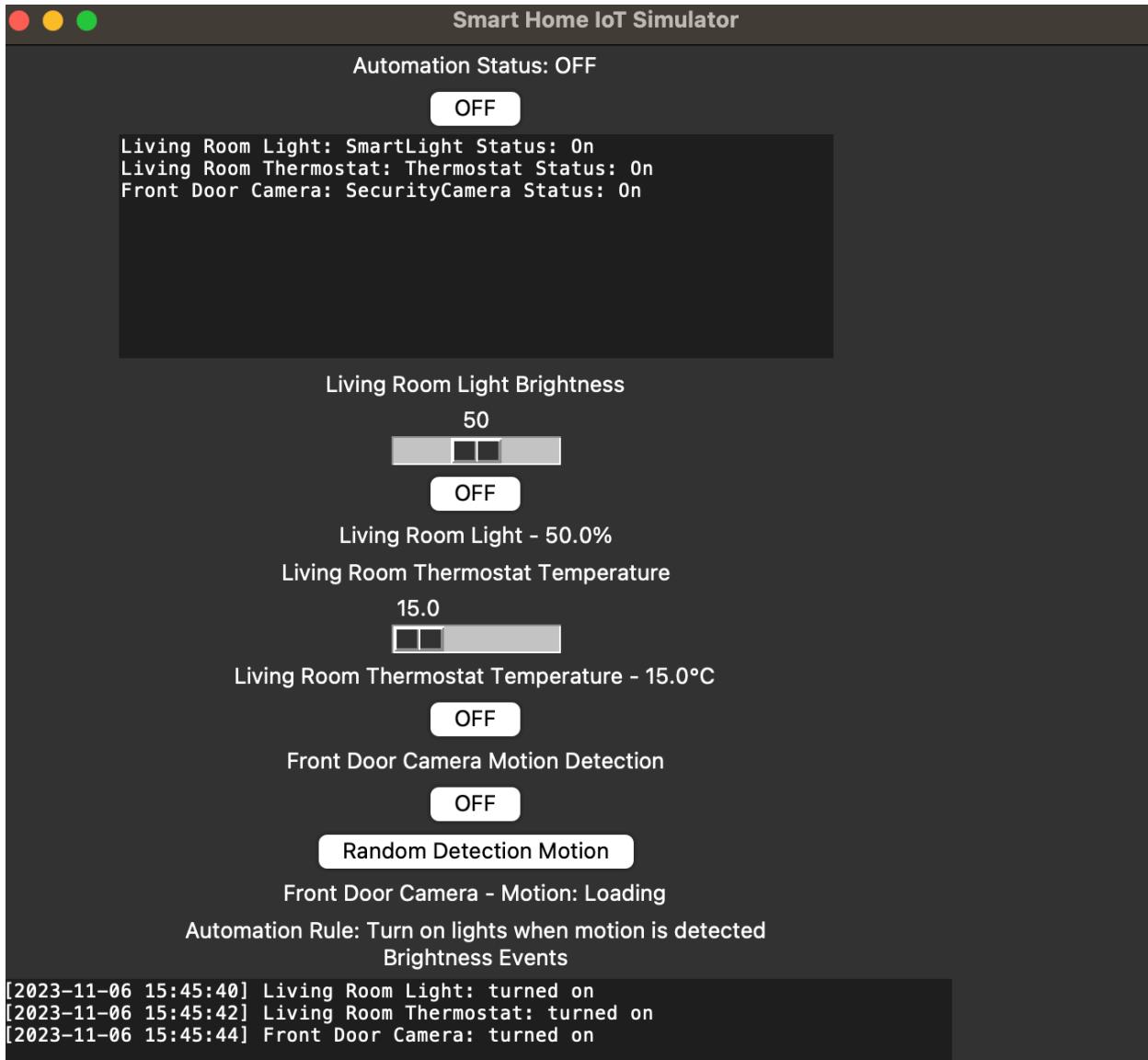
Summarizing the examination of the Light Deactivation Test,
under any circumstances, if the camera no longer detects motions,
the light is turned off automatically.

3. Status button test

I'd like to make sure if the user pushes the button to make the device status "on" and "off", the device's status should be changed to "on" and "off". In the first stage, all of the devices are set to "off".

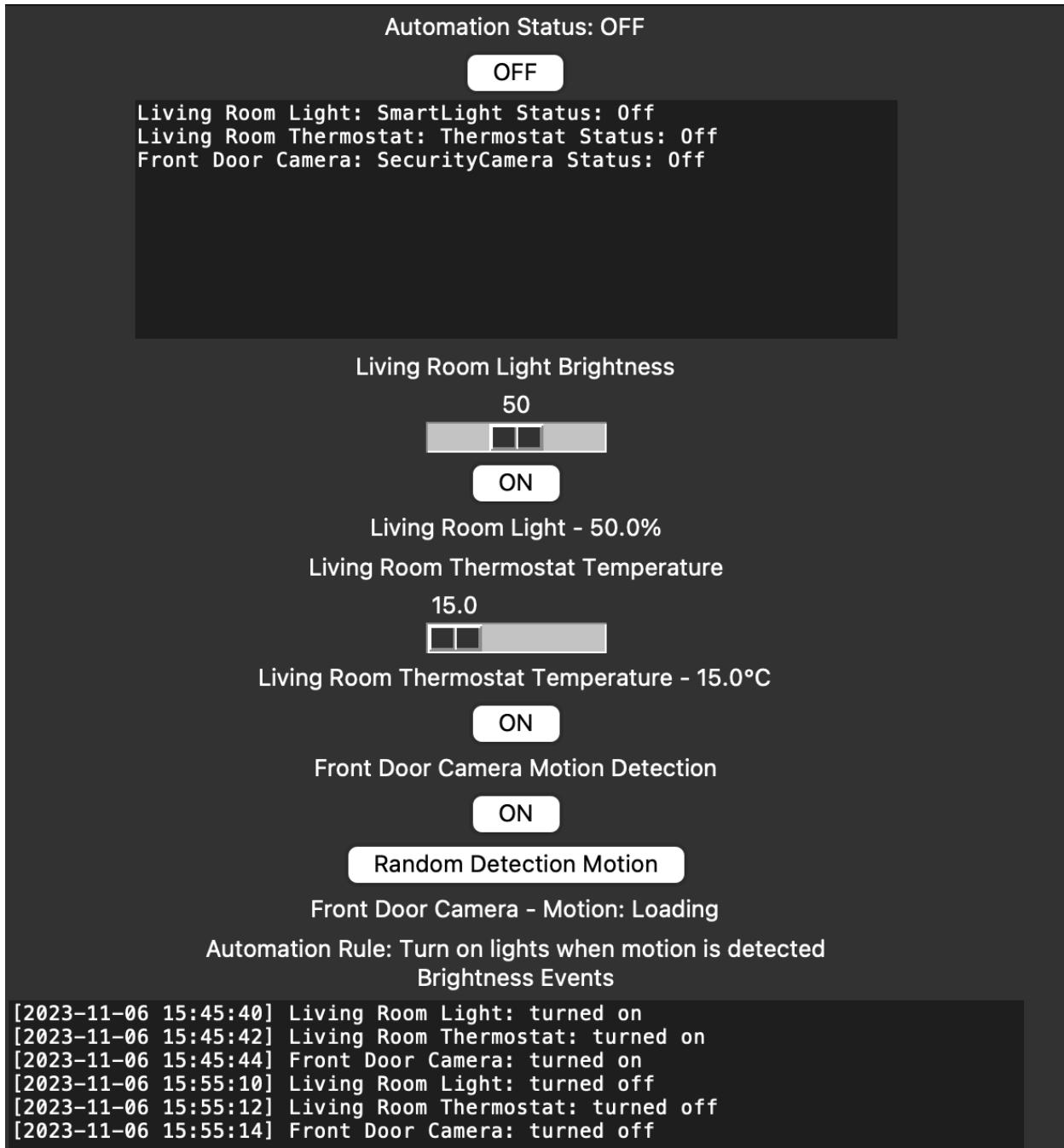
a) pushes three buttons to make the device status "on"

As you can see, all of the devices are set to be "on". Also, three of the buttons are toggled properly showing "off" in case the device status is set to "on", and logs are shown properly.



b) pushes three buttons to make the device status “off”

As you can see, all of the devices are set to be “off”. Also, three of the buttons are toggled properly showing “on” in case the device status is set to “off”, and logs are shown properly.



For the above tests, concluded that The buttons' functionality is satisfied.

4. Light slide test

Make sure that if the light status is “off”, not able to set brightness. Otherwise, able to do within 1 to 100 (%)

- a) if the status is “off”, move the slide to the increasing direction as you can see, not able to set it.



b) if the status is “on”, move the slide to the increasing direction

as you can see, desired number is set if the status is “on”

Smart Home IoT Simulator

Automation Status: OFF

OFF

Living Room Light: SmartLight Status: On
Living Room Thermostat: Thermostat Status: Off
Front Door Camera: SecurityCamera Status: Off

Living Room Light Brightness

100



OFF

Living Room Light - 100.0%

Living Room Thermostat Temperature

15.0



Living Room Thermostat Temperature - 15.0°C

ON

Front Door Camera Motion Detection

ON

Random Detection Motion

Front Door Camera - Motion: Loading

Automation Rule: Turn on lights when motion is detected
Brightness Events

```
[2023-11-06 16:21:03] Living Room Light: turned on
[2023-11-06 16:21:09] Living Room Light: brightness is set to 51% from 0%
[2023-11-06 16:21:09] Living Room Light: brightness is set to 56% from 51%
[2023-11-06 16:21:09] Living Room Light: brightness is set to 65% from 56%
[2023-11-06 16:21:09] Living Room Light: brightness is set to 78% from 65%
[2023-11-06 16:21:09] Living Room Light: brightness is set to 88% from 78%
[2023-11-06 16:21:09] Living Room Light: brightness is set to 96% from 88%
[2023-11-06 16:21:09] Living Room Light: brightness is set to 100% from 96%
```

For the above tests, concluded that the brightness functionality is satisfied.

4. temperature slide test

Make sure that if the light status is “off”, not able to set the temperature. Otherwise, able to do it within 15.0 to 30.0 (°C)

- a) in case the light status is “off”, move the slide to the positive direction

As you can see if the status is off. I cannot set temperature

Smart Home IoT Simulator

Automation Status: OFF

OFF

Living Room Light: SmartLight Status: On
Living Room Thermostat: Thermostat Status: Off
Front Door Camera: SecurityCamera Status: Off

Living Room Light Brightness

100



OFF

Living Room Light - 100.0%

Living Room Thermostat Temperature

24.7



Living Room Thermostat Temperature - 15.0°C

ON

Front Door Camera Motion Detection

ON

Random Detection Motion

Front Door Camera - Motion: Loading

Automation Rule: Turn on lights when motion is detected

Brightness Events

```
[2023-11-06 16:38:06] Living Room Thermostat: turned off
[2023-11-06 16:38:08] Living Room Thermostat :Cannot set temperature when the thermostat is off.
[2023-11-06 16:38:08] Living Room Thermostat: 15.0°C
[2023-11-06 16:38:08] Living Room Thermostat :Cannot set temperature when the thermostat is off.
[2023-11-06 16:38:08] Living Room Thermostat: 15.0°C
[2023-11-06 16:38:08] Living Room Thermostat :Cannot set temperature when the thermostat is off.
[2023-11-06 16:38:08] Living Room Thermostat: 15.0°C
[2023-11-06 16:38:08] Living Room Thermostat :Cannot set temperature when the thermostat is off.
[2023-11-06 16:38:08] Living Room Thermostat: 15.0°C
[2023-11-06 16:38:08] Living Room Thermostat :Cannot set temperature when the thermostat is off.
[2023-11-06 16:38:08] Living Room Thermostat: 15.0°C
```

a) in case the light status is “on”, move the slide to the positive direction

as you can see, the desired number is set if the status is “on”

Smart Home IoT Simulator

Automation Status: OFF

OFF

Living Room Light: SmartLight Status: On
Living Room Thermostat: Thermostat Status: On
Front Door Camera: SecurityCamera Status: Off

Living Room Light Brightness

100

OFF

Living Room Light - 100.0%

Living Room Thermostat Temperature

21.0

Living Room Thermostat Temperature - 21.0°C

OFF

Front Door Camera Motion Detection

ON

Random Detection Motion

Front Door Camera - Motion: Loading

Automation Rule: Turn on lights when motion is detected

Brightness Events

```
[2023-11-06 16:40:03] Living Room Thermostat: turned on
[2023-11-06 16:40:07] Living Room Thermostat: temperature is set to 24.3 from 15.0
[2023-11-06 16:40:07] Living Room Thermostat: 24.3°C
[2023-11-06 16:40:07] Living Room Thermostat: temperature is set to 23.4 from 24.3
[2023-11-06 16:40:07] Living Room Thermostat: 23.4°C
[2023-11-06 16:40:07] Living Room Thermostat: temperature is set to 22.5 from 23.4
[2023-11-06 16:40:07] Living Room Thermostat: 22.5°C
[2023-11-06 16:40:07] Living Room Thermostat: temperature is set to 21.8 from 22.5
[2023-11-06 16:40:07] Living Room Thermostat: 21.8°C
[2023-11-06 16:40:07] Living Room Thermostat: temperature is set to 21.2 from 21.8
[2023-11-06 16:40:07] Living Room Thermostat: 21.2°C
[2023-11-06 16:40:07] Living Room Thermostat: temperature is set to 20.7 from 21.2
[2023-11-06 16:40:07] Living Room Thermostat: 20.7°C
```

For the above tests, concluded that the brightness functionality is satisfied.

4. camera button test

Make sure that if the camera status is “off”, not able to set the security status. Otherwise, able to do it.

a) in case the camera status is “off”, push detect button

as you can see if the camera status is “off”, cannot set the security status.

Smart Home IoT Simulator

Automation Status: OFF

OFF

Living Room Light: SmartLight Status: On
Living Room Thermostat: Thermostat Status: On
Front Door Camera: SecurityCamera Status: Off

Living Room Light Brightness

100

OFF

Living Room Light - 100.0%

Living Room Thermostat Temperature

21.0

OFF

Living Room Thermostat Temperature - 21.0°C

Front Door Camera Motion Detection

ON

Random Undetection Motion

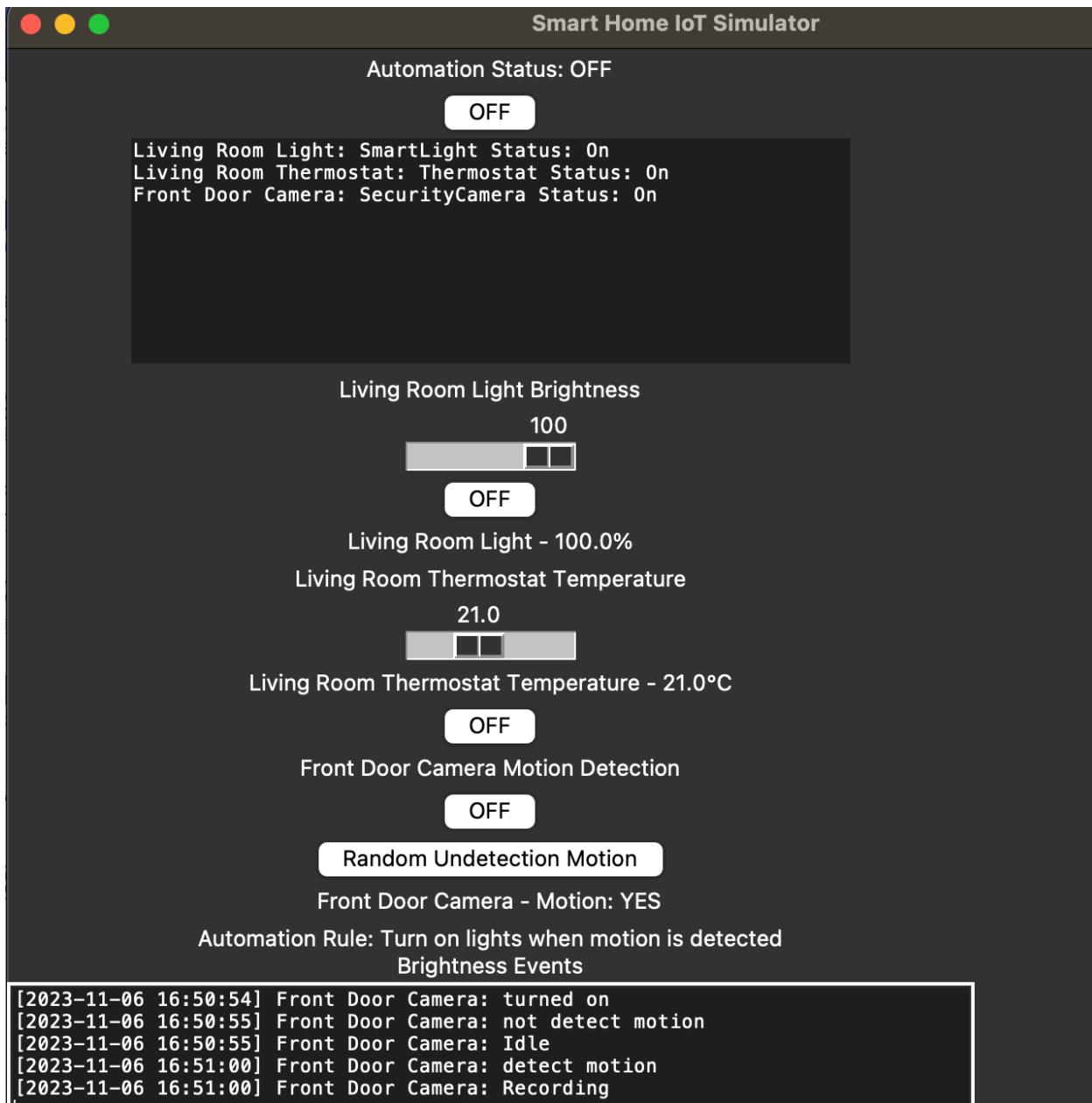
Front Door Camera - Motion: YES

Automation Rule: Turn on lights when motion is detected
Brightness Events

```
[2023-11-06 16:43:18] Front Door Camera: turned off  
[2023-11-06 16:43:20] Front Door Camera: Cannot set security status when the camera is off.]
```

b) in case the camera status is “on”, push detect button

as you can see if the camera status is “on”, able to set the security status. If the security status is “idle”, “idle” is changed to “recording” and vice versa.



For above the tests, The camera button' functionality is satisfied.

5. automation test

Make sure that If the automation button is on, automation will be started.

a) pushing the button to make automation status “ON”

as you can see, the automation system works properly, and the automation rule is also satisfied. Also, the button text is toggled correctly.

Automation Status: ON

ON

Living Room Light: SmartLight Status: Off
Living Room Thermostat: Thermostat Status: Off
Front Door Camera: SecurityCamera Status: Off

Living Room Light Brightness

50



ON

Living Room Light - 50.0%

Living Room Thermostat Temperature

15.0



Living Room Thermostat Temperature - 15.0°C

ON

Front Door Camera Motion Detection

ON

Random Detection Motion

Front Door Camera - Motion: Loading

Automation Rule: Turn on lights when motion is detected
Brightness Events

```
[2023-11-07 12:59:21] Living Room Light: turned off
[2023-11-07 12:59:26] Living Room Thermostat :Cannot set temperature when the
thermostat is off.
[2023-11-07 12:59:26] Front Door Camera: Cannot set security status when the
camera is off.
[2023-11-07 12:59:26] Living Room Light: turned on
[2023-11-07 12:59:26] Living Room Light: Current brightness: 20.00
[2023-11-07 12:59:26] Living Room Light: Current brightness: 40.00
[2023-11-07 12:59:26] Living Room Light: Current brightness: 60.00
[2023-11-07 12:59:26] Living Room Light: Current brightness: 80.00
[2023-11-07 12:59:26] Living Room Light: Current brightness: 100.00
[2023-11-07 12:59:26] Living Room Light: turned off
[2023-11-07 12:59:31] Living Room Thermostat :Cannot set temperature when the
thermostat is off.
[2023-11-07 12:59:31] Front Door Camera: Cannot set security status when the
camera is off.
```

For above the tests, the automation button' functionality is satisfied.