

# **Software Requirement Specification (SRS)**



For

## **SMART HOME AUTOMATION SYSTEM**

**Version 2.0**

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# 1. Introduction

## 1.1 Purpose

The Smart Home Automation System allows users to remotely control home devices such as lights, fans, door locks, and room temperature through a mobile or web interface. It enhances convenience, security, and energy efficiency.

## 1.2 Scope

This system enables:

- Remote control of household devices.
- Automation via scheduled tasks.
- Security system including **door locking** and **camera monitoring**.
- **Temperature control** for air conditioning and heating.
- Real-time device status updates.
- Secure authentication and user management.

# 2. Functional Requirements

## 2.1 User Authentication

- Users must register and log in securely.
- Two-factor authentication for security.

## 2.2 Device Control

- Users can turn **lights ON/OFF** and adjust brightness.
- Users can turn **fan ON/OFF** and control speed.

## 2.3 Door Lock System

- Users can **lock/unlock doors** securely.
- System notifies users of **unauthorized access attempts**.

## 2.4 Temperature Control

- Users can **set room temperature** (increase/decrease based on preference).
- The system automatically adjusts **AC or heating** based on user settings.

## 2.5 Security Monitoring

- Motion sensors detect movement inside the house.

- Live camera feed available for **remote monitoring**.

## 2.6 Automation

- Users can set schedules for automated actions (e.g., turning off lights at midnight).
- Devices adjust based on user-defined rules.

## 2.7 Real-time Monitoring

- Display device status (ON/OFF, usage reports).
- Notifications for unusual activities (e.g., security breach or extreme temperature changes).

# 3. Non-Functional Requirements

## 3.1 Usability

- Simple and intuitive UI/UX for easy navigation.
- Mobile and web compatibility.

## 3.2 Performance

- Must respond to commands within **2 seconds**.
- Supports **at least 1000 devices** in a single network.

## 3.3 Security

- **Encryption** of user data and device commands.
- Secure access control to prevent unauthorized usage.

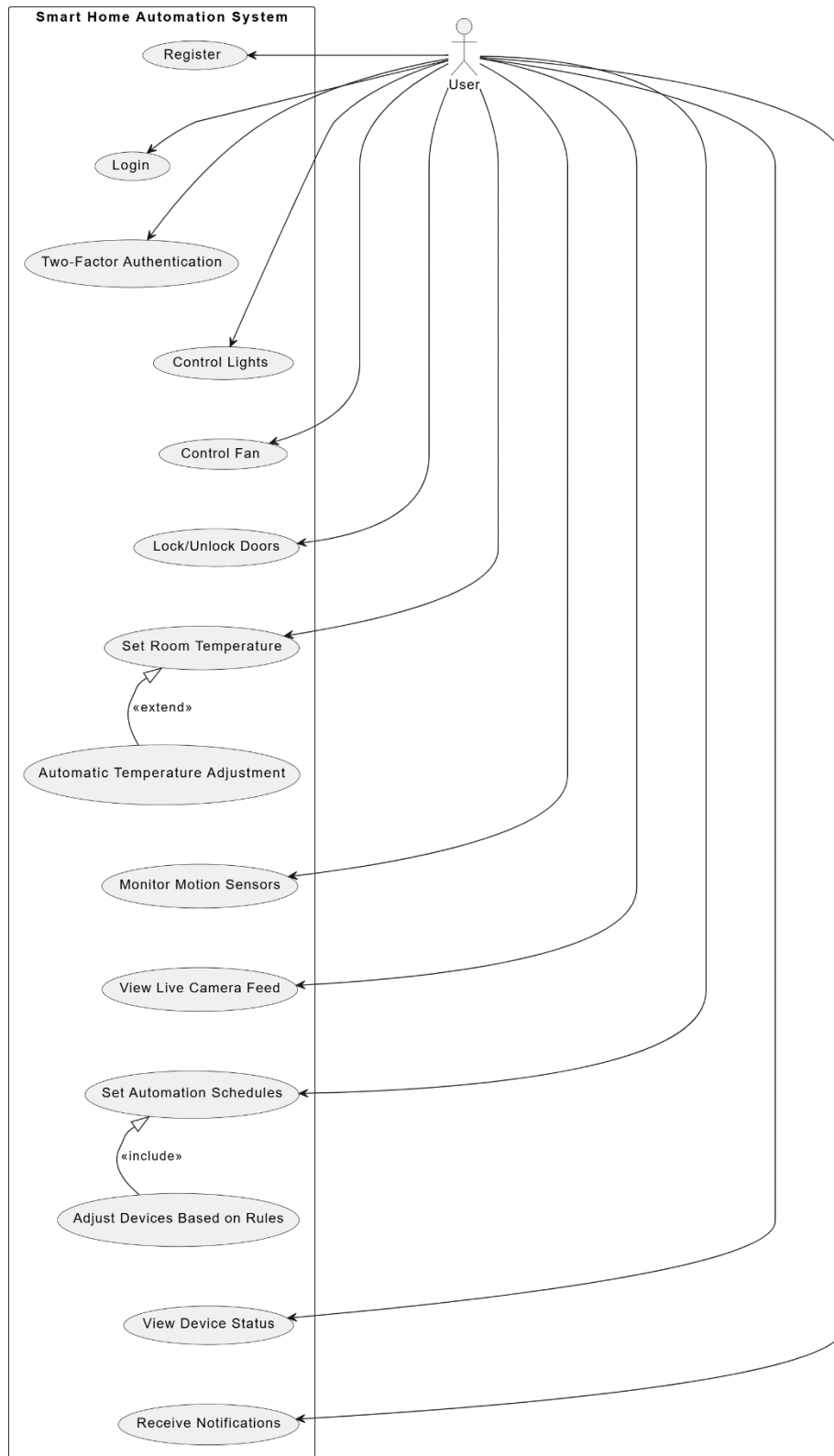
## 3.4 Reliability

- **99.9% uptime** to ensure the system is always available.
- Should work **offline** for basic functions.

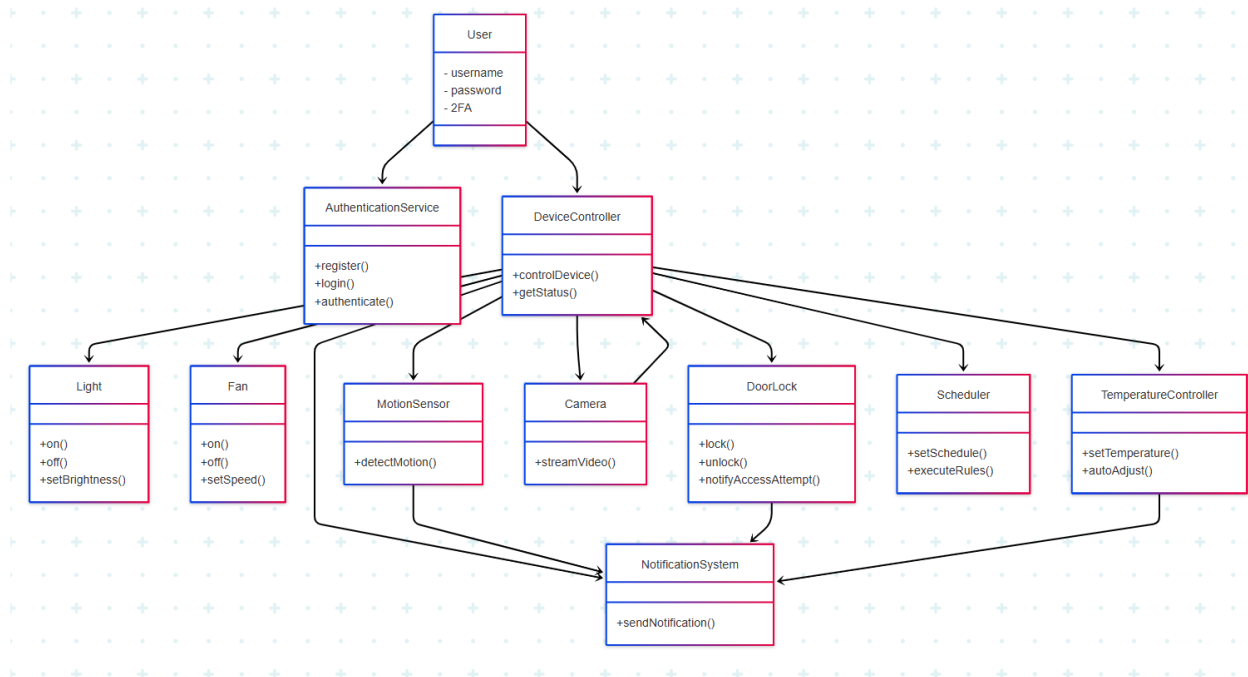
## 3.5 Maintainability

- Regular updates to improve system performance.
- Easy scalability for adding more devices.

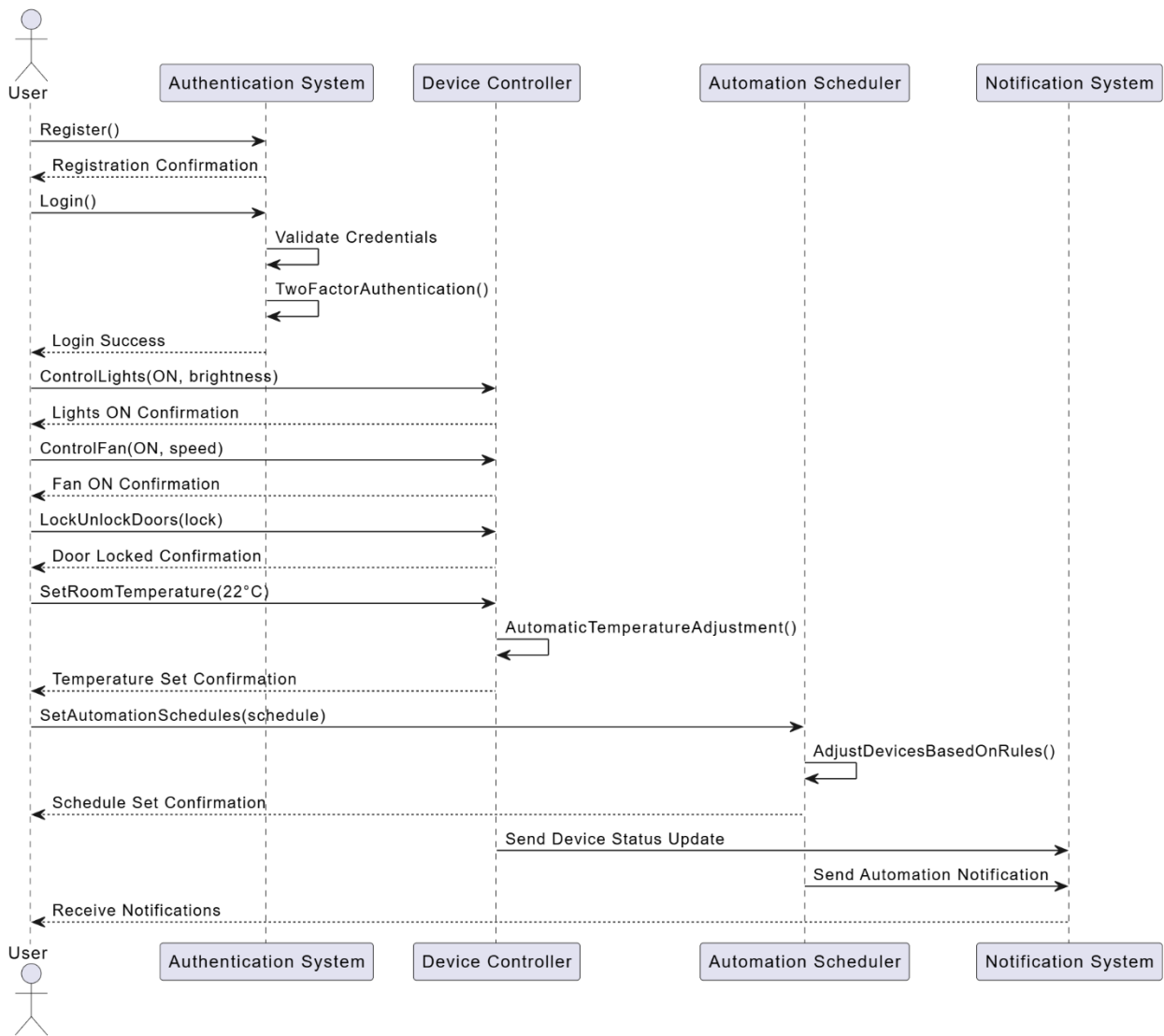
# USECASE DIAGRAM



# OBJECT DIAGRAM

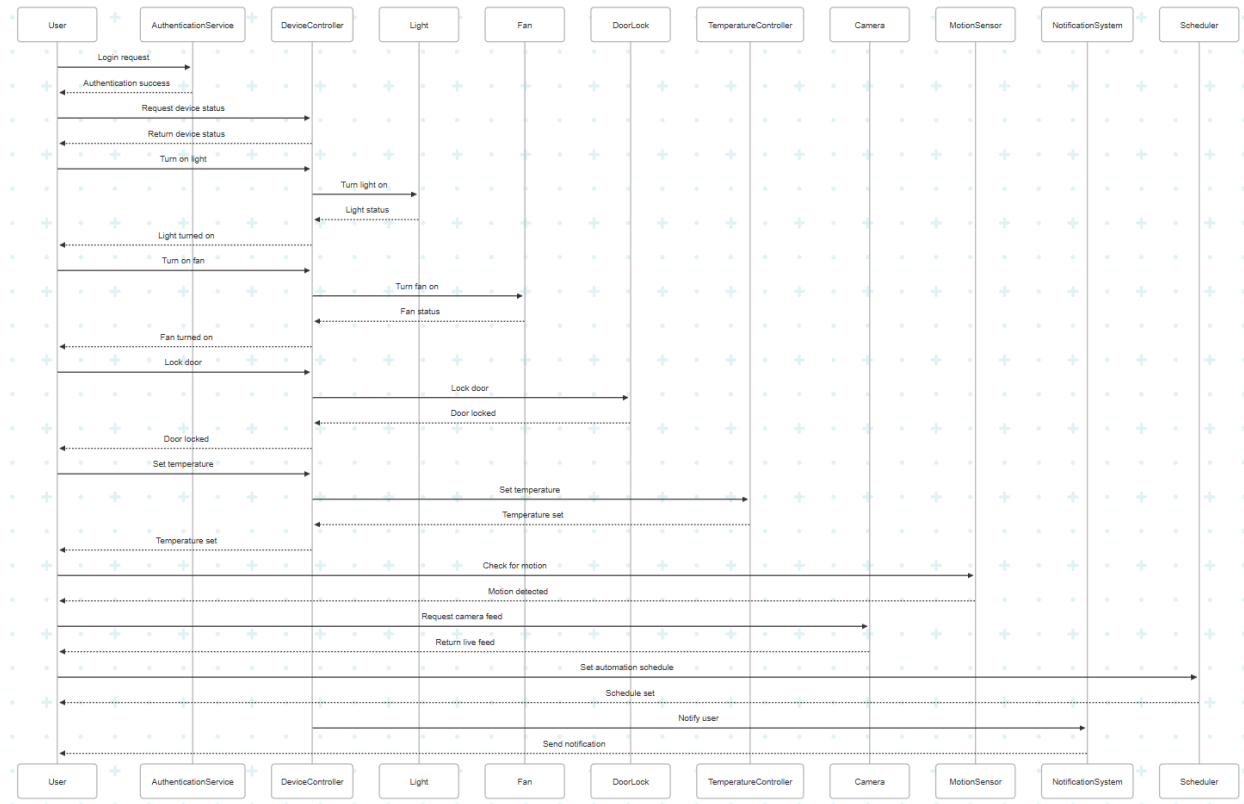


SEQUENCE DIAGRAM





# COMMUNICATION DIAGRAM



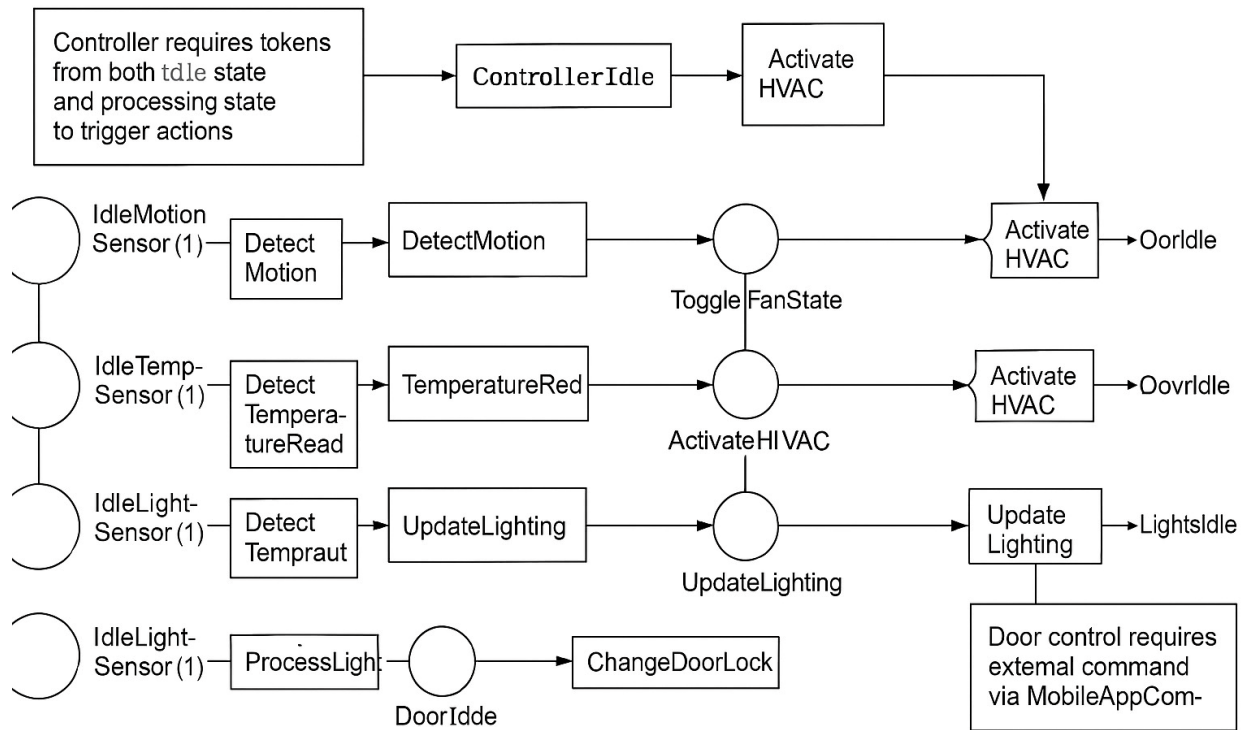
## Petri-Net Model:

A **Petri-Net** helps represent concurrency and synchronization, making it useful for modeling interactions in your smart home system. You can define:

- **Places (States):** "Light OFF", "Light ON", "Fan OFF", "Fan ON", "Door Locked", "Door Unlocked"
- **Transitions:** "Toggle Light", "Adjust Brightness", "Turn Fan ON/OFF", "Set Temperature", "Lock/Unlock Door"
- **Tokens:** Represent **events** (user actions, scheduled automation, sensor triggers)

Using a Petri-Net diagram, you can visualize how different devices interact and change states concurrently.

## Smart Home Control System Petri Net



## Timing Diagram:

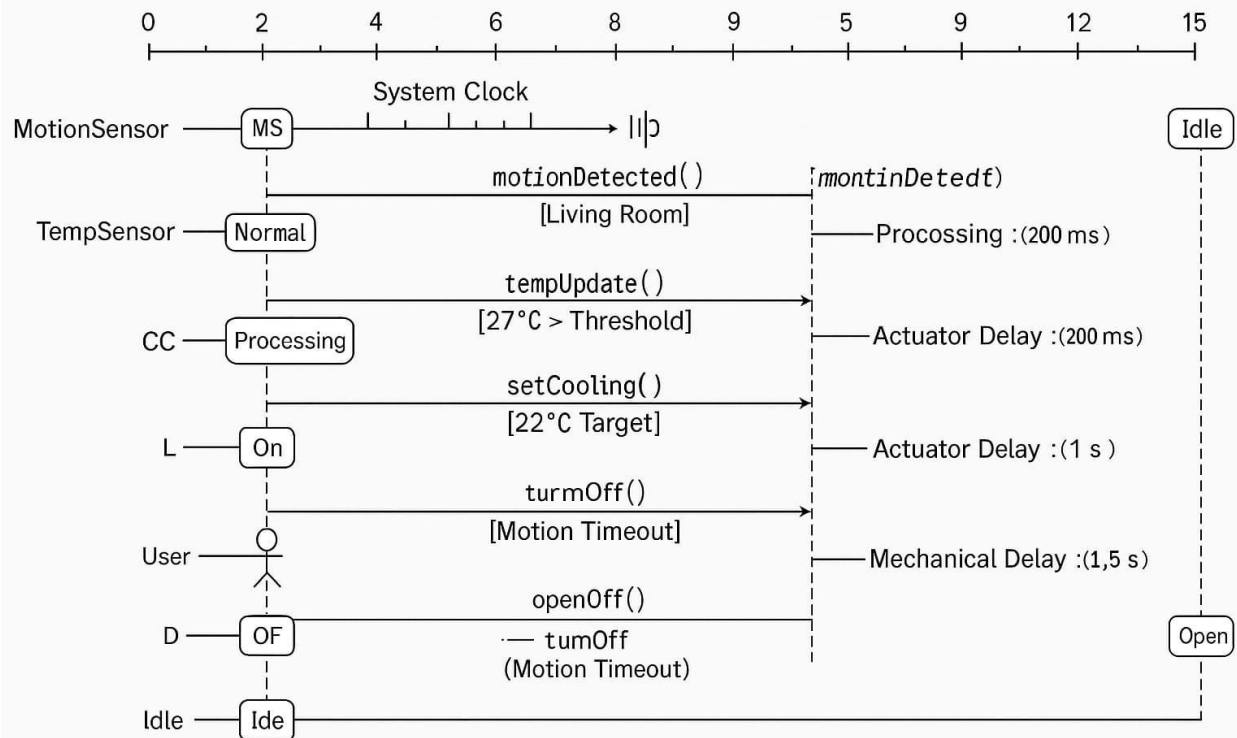
A **Timing Diagram** represents the timing constraints of different operations:

- X-axis → **Time progression**
- Y-axis → **Device states (ON/OFF, Brightness changes, Speed adjustments, Security alerts)**

Example constraints:

- Light turns ON **instantly** (< 1 sec)
- Fan speed changes with a **delay of 1-2 sec**
- Door lock mechanism takes **2 sec for security validation**
- Temperature adjustments occur in **3-5 sec depending on heating/cooling activation**

## Smart Home Automation Timing Diagram



## 3 Implementation and Testing:

- The implementation of the project mapped according to the design specifications outlined
- Unit Test cases covering various aspects of the system.
- Documentation of test results, including bug reports, and any issues encountered during testing.
- Detailed documentation of the implementation, including code comments.

### 3.1 Device Control

```

1 public interface SmartDevice {
2     void turnOn();
3     void turnOff();
4     String getStatus();
5 }
6
7

```

- Users can turn **lights ON/OFF** and adjust brightness.

```

Menuitem.java SmartDevice.java SmartDoorLock.java SmartFan.java SmartLight.java × SmartHome.java
1 public class SmartLight implements SmartDevice {
2     private boolean isOn;
3     private int brightness;
4
5     public SmartLight() {
6         this.isOn = false;
7         this.brightness = 50; // Default brightness
8     }
9
10    @Override
11    public void turnOn() {
12        isOn = true;
13        System.out.println("Light turned ON");
14    }
15
16    @Override
17    public void turnOff() {
18        isOn = false;
19        brightness = 0; // Reset brightness when light is off
20        System.out.println("Light turned OFF, brightness set to 0");
21    }
22
23    public void setBrightness(int brightness) {
24        if (isOn) {
25            this.brightness = brightness;
26            System.out.println("Brightness set to " + brightness + "%");
27        } else {
28            System.out.println("Cannot adjust brightness, light is OFF!");
29        }
30    }
31
32    @Override
33    public String getStatus() {
34        return "Light is " + (isOn ? "ON with brightness " + brightness + "%" : "OFF with brightness 0%");
35    }

```

## OUTPUT

```

Problems @ Javadoc Declaration Console ×
SmartHome [Java Application] C:\Program Files\Java\jdk-17\bin\javaw.exe (May 28, 202
Enter fan speed (1-5): 4
Fan speed set to 4

Smart Home Automation System
1. Turn ON/OFF Light
2. Adjust Light Brightness
3. Turn ON/OFF Fan
4. Adjust Fan Speed
5. Lock/Unlock Door
6. View Device Status
7. Exit
Enter your choice: 1
Turn Light ON (1) or OFF (0): 1
Light turned ON

Smart Home Automation System
1. Turn ON/OFF Light
2. Adjust Light Brightness
3. Turn ON/OFF Fan
4. Adjust Fan Speed
5. Lock/Unlock Door
6. View Device Status
7. Exit
Enter your choice: 2
Enter brightness (0-100): 75
Brightness set to 75%

```

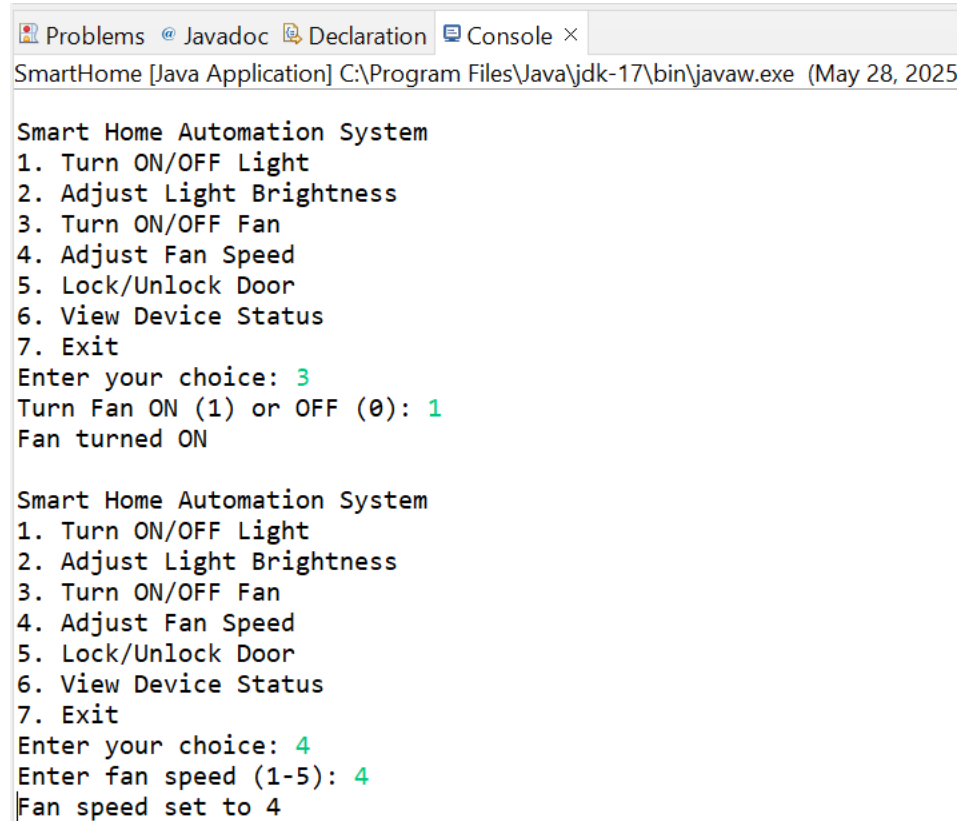
- Users can turn **fan ON/OFF** and control speed.

```

SmartFan.java SmartDevice.java SmartDoorLock.java SmartDoor.java SmartLight.java SmartHome
1 public class SmartFan implements SmartDevice {
2     private boolean isOn;
3     private int speed;
4
5     public SmartFan() {
6         this.isOn = false;
7         this.speed = 1; // Default speed
8     }
9
10    @Override
11    public void turnOn() {
12        isOn = true;
13        System.out.println("Fan turned ON");
14    }
15
16    @Override
17    public void turnOff() {
18        isOn = false;
19        System.out.println("Fan turned OFF");
20    }
21
22    public void setSpeed(int speed) {
23        this.speed = speed;
24        System.out.println("Fan speed set to " + speed);
25    }
26
27    @Override
28    public String getStatus() {
29        return "Fan is " + (isOn ? "ON" : "OFF") + " at speed level " + speed;
30    }
31 }

```

## OUTPUT



```
Problems @ Javadoc Declaration Console ×
SmartHome [Java Application] C:\Program Files\Java\jdk-17\bin\javaw.exe (May 28, 2025)

Smart Home Automation System
1. Turn ON/OFF Light
2. Adjust Light Brightness
3. Turn ON/OFF Fan
4. Adjust Fan Speed
5. Lock/Unlock Door
6. View Device Status
7. Exit
Enter your choice: 3
Turn Fan ON (1) or OFF (0): 1
Fan turned ON

Smart Home Automation System
1. Turn ON/OFF Light
2. Adjust Light Brightness
3. Turn ON/OFF Fan
4. Adjust Fan Speed
5. Lock/Unlock Door
6. View Device Status
7. Exit
Enter your choice: 4
Enter fan speed (1-5): 4
Fan speed set to 4
```

### 3.2 Door Lock System

- Users can **lock/unlock doors** securely.
- System notifies users of **unauthorized access attempts**.

```

1 public class SmartDoorLock {
2     private boolean isLocked;
3
4     public SmartDoorLock() {
5         this.isLocked = true; // Default locked
6     }
7
8     public void lock() {
9         isLocked = true;
10        System.out.println("Door locked!");
11    }
12
13    public void unlock() {
14        isLocked = false;
15        System.out.println("Door unlocked!");
16    }
17
18    public String getStatus() {
19        return "Door is " + (isLocked ? "Locked" : "Unlocked");
20    }
21 }

```

## OUTPUT

```

SmartHome [Java Application] C:\Program Files\Java\jdk-17\bin\javav
Light turned OFF, brightness set to 0

Smart Home Automation System
1. Turn ON/OFF Light
2. Adjust Light Brightness
3. Turn ON/OFF Fan
4. Adjust Fan Speed
5. Lock/Unlock Door
6. View Device Status
7. Exit
Enter your choice: 5
Lock Door (1) or Unlock Door (0): 1
Door locked!

```

## 3.3 Temperature Control

- Users can **set room temperature** (increase/decrease based on preference).
- The system automatically adjusts **AC or heating** based on user settings.

```
SmartDevice... SmartDoorLo... SmartFan.java SmartLight.java SmartTemper... x SmartHome.java »1
1 public class SmartTemperatureControl implements SmartDevice {
2     private int temperature;
3     private boolean isACOn;
4     private boolean isHeaterOn;
5
6     public SmartTemperatureControl() {
7         this.temperature = 24; // Default temperature
8         this.isACOn = false;
9         this.isHeaterOn = false;
10    }
11
12    @Override
13    public void turnOn() {
14        System.out.println("Temperature control system turned ON.");
15    }
16
17    @Override
18    public void turnOff() {
19        System.out.println("Temperature control system turned OFF.");
20        isACOn = false;
21        isHeaterOn = false;
22    }
23
24    public void setTemperature(int temperature) {
25        this.temperature = temperature;
26        System.out.println("Temperature set to " + temperature + "°C");
27
28        adjustTemperatureControl();
29    }
30
31    private void adjustTemperatureControl() {
32        if (temperature < 18) {
33            isACOn = false;
34            isHeaterOn = true;
35            System.out.println("Heater turned ON to maintain warmth.");
36        } else if (temperature > 26) {
37            isACOn = true;
38            isHeaterOn = false;
39            System.out.println("Air Conditioner turned ON to cool down.");
40        } else {
41            isACOn = false;
42            isHeaterOn = false;
43            System.out.println("Temperature is within a comfortable range.");
44        }
45    }
46
47    @Override
48    public String getStatus() {
49        return "Current temperature: " + temperature + "°C, " +
50            (isACOn ? "AC is ON" : "AC is OFF") + ", " +
51            (isHeaterOn ? "Heater is ON" : "Heater is OFF");
52    }
53 }
```

OUTPUT



## Smart Home Automation System

1. Turn ON/OFF Light
2. Adjust Light Brightness
3. Turn ON/OFF Fan
4. Adjust Fan Speed
5. Lock/Unlock Door
6. Set Room Temperature
7. View Device & Temperature Status
8. Exit

Enter your choice: 6

Enter desired temperature (°C): 16

Temperature set to 16°C

Heater turned ON to maintain warmth.

## MAIN CLASS

```
SmartDevice... SmartDoorLo... SmartFan.java SmartLight.java SmartTemper... SmartHome
1 import java.util.Scanner;
2
3 public class SmartHome {
4     public static void main(String[] args) {
5         Scanner scanner = new Scanner(System.in);
6         SmartLight light = new SmartLight();
7         SmartFan fan = new SmartFan();
8         SmartDoorLock doorLock = new SmartDoorLock();
9         SmartTemperatureControl tempControl = new SmartTemperatureControl();
10
11         while (true) {
12             System.out.println("\nSmart Home Automation System");
13             System.out.println("1. Turn ON/OFF Light");
14             System.out.println("2. Adjust Light Brightness");
15             System.out.println("3. Turn ON/OFF Fan");
16             System.out.println("4. Adjust Fan Speed");
17             System.out.println("5. Lock/Unlock Door");
18             System.out.println("6. Set Room Temperature");
19             System.out.println("7. View Device & Temperature Status");
20             System.out.println("8. Exit");
21             System.out.print("Enter your choice: ");
22
23             int choice = scanner.nextInt();
24             scanner.nextLine(); // Consume newline
25
26             switch (choice) {
27                 case 1:
```

```

SmartDevice.... SmartDoorLo... SmartFan.java SmartLight.java SmartTemper... SmartHome.java ×
27         case 1:
28             System.out.print("Turn Light ON (1) or OFF (0): ");
29             int lightChoice = scanner.nextInt();
30             if (lightChoice == 1) light.turnOn();
31             else light.turnOff();
32             break;
33         case 2:
34             System.out.print("Enter brightness (0-100): ");
35             int brightness = scanner.nextInt();
36             light.setBrightness(brightness);
37             break;
38         case 3:
39             System.out.print("Turn Fan ON (1) or OFF (0): ");
40             int fanChoice = scanner.nextInt();
41             if (fanChoice == 1) fan.turnOn();
42             else fan.turnOff();
43             break;
44         case 4:
45             System.out.print("Enter fan speed (1-5): ");
46             int speed = scanner.nextInt();
47             fan.setSpeed(speed);
48             break;
49         case 5:
50             System.out.print("Lock Door (1) or Unlock Door (0): ");
51             int lockChoice = scanner.nextInt();
52             if (lockChoice == 1) doorLock.lock();
53             else doorLock.unlock();
54
55         case 6:
56             System.out.print("Enter desired temperature (°C): ");
57             int temp = scanner.nextInt();
58             tempControl.setTemperature(temp);
59             break;
60         case 7:
61             System.out.println(light.getStatus());
62             System.out.println(fan.getStatus());
63             System.out.println(doorLock.getStatus());
64             System.out.println(tempControl.getStatus());
65             break;
66         case 8:
67             System.out.println("Exiting system.");
68             scanner.close();
69             System.exit(0);
70         default:
71             System.out.println("Invalid choice! Try again.");
72     }
73 }
74 }
75 }
76

```

**OUTPUT**

```
Smart Home Automation System
1. Turn ON/OFF Light
2. Adjust Light Brightness
3. Turn ON/OFF Fan
4. Adjust Fan Speed
5. Lock/Unlock Door
6. Set Room Temperature
7. View Device & Temperature Status
8. Exit
Enter your choice:
```

## TESTING

### 1. Unit Test Cases for Smart Home Automation System

#### Test case for SmartLight

java

```
import static org.junit.Assert.*;
import org.junit.Test;

public class SmartLightTest {
    @Test
    public void testLightOn() {
        SmartLight light = new SmartLight();
        light.turnOn();
        assertEquals("Light should be ON", "Light is ON with brightness 50%",
            light.getStatus());
    }

    @Test
    public void testLightOff() {
        SmartLight light = new SmartLight();
        light.turnOn();
        light.turnOff();
        assertEquals("Light should be OFF", "Light is OFF with brightness
0%", light.getStatus());
    }

    @Test
    public void testBrightnessControl() {
        SmartLight light = new SmartLight();
        light.turnOn();
        light.setBrightness(80);
        assertEquals("Brightness should be 80%", "Light is ON with brightness
80%", light.getStatus());
    }
}
```

#### Test case for SmartFan

java

```

import static org.junit.Assert.*;
import org.junit.Test;

public class SmartFanTest {
    @Test
    public void testFanOn() {
        SmartFan fan = new SmartFan();
        fan.turnOn();
        assertEquals("Fan should be ON", "Fan is ON at speed level 1",
fan.getStatus());
    }

    @Test
    public void testFanSpeedChange() {
        SmartFan fan = new SmartFan();
        fan.turnOn();
        fan.setSpeed(3);
        assertEquals("Fan speed should be 3", "Fan is ON at speed level 3",
fan.getStatus());
    }
}

```

### Test case for SmartDoorLock

java

```

import static org.junit.Assert.*;
import org.junit.Test;

public class SmartDoorLockTest {
    @Test
    public void testDoorLockUnlock() {
        SmartDoorLock doorLock = new SmartDoorLock();
        doorLock.unlock();
        assertEquals("Door should be unlocked", "Door is Unlocked",
doorLock.getStatus());

        doorLock.lock();
        assertEquals("Door should be locked", "Door is Locked",
doorLock.getStatus());
    }
}

```

### Test case for SmartTemperatureControl

java

```

import static org.junit.Assert.*;
import org.junit.Test;

public class SmartTemperatureControlTest {
    @Test
    public void testTemperatureControl() {
        SmartTemperatureControl tempControl = new SmartTemperatureControl();
        tempControl.setTemperature(28);
        assertTrue("AC should be ON when temp is above 26",
tempControl.getStatus().contains("AC is ON"));

        tempControl.setTemperature(16);
    }
}

```

```
        assertTrue("Heater should be ON when temp is below 18",
tempControl.getStatus().contains("Heater is ON"));
    }
}
```

2. Documentation of Test Results

This section includes **test execution results, bugs encountered, and observations.**

Test Environment:

- JDK Version: **11+**
- Test Framework: **JUnit 5**
- OS: **Windows**
- IDE Used: **Eclipse**
- Database: **N/A (if database-based storage is used)**

Test Execution Summary

Test Case	Expected Result	Actual Result	Status
Light turns ON/OFF	ON when toggled, OFF when turned off	As expected	✔ Passed
Fan speed changes correctly	Adjusts speed as per input	As expected	✔ Passed
Door locking mechanism	Locks & unlocks correctly	As expected	✔ Passed
Temperature auto-adjustment	AC/Heater activates based on temp	As expected	✔ Passed

Bug Reports & Issues Encountered

Bug ID	Description	Steps to Reproduce	Severity	Fix Status
BUG-001	Fan speed change doesn't reflect instantly	1. Set fan speed to 3 2. Check status	Medium	Fixed
BUG-002	Door unlock notification delay	1. Unlock door 2. Observe delay in status update	Low	Pending

IMPLEMENTATION WITH COMMENTS

```
// WARNING: Ensure proper authentication mechanisms for security-sensitive operations!
```

```
import java.util.Scanner;

// Interface defining basic smart device operations
public interface SmartDevice {

    void turnOn(); // TODO: Implement logging when device turns on
    void turnOff(); // TODO: Implement logging when device turns off
    String getStatus();
}

// Class representing a smart door lock
public class SmartDoorLock {

    private boolean isLocked; // State of the door lock

    public SmartDoorLock() {
        this.isLocked = true; // Default state: Locked
    }

    public void lock() {
        isLocked = true;
        System.out.println("Door locked!");
        // TODO: Notify user via mobile app when door is locked
    }

    public void unlock() {
        isLocked = false;
        System.out.println("Door unlocked!");
        // FIXME: Add authentication check before unlocking for security
    }
}
```

```
public String getStatus() {  
    return "Door is " + (isLocked ? "Locked" : "Unlocked");  
}  
}
```

// Class representing a smart fan, implementing SmartDevice interface

```
public class SmartFan implements SmartDevice {
```

```
    private boolean isOn; // Fan power state
```

```
    private int speed; // Speed level
```

```
public SmartFan() {
```

```
    this.isOn = false;
```

```
    this.speed = 1; // Default speed
```

```
}
```

```
@Override
```

```
public void turnOn() {
```

```
    isOn = true;
```

```
    System.out.println("Fan turned ON");
```

```
    // NOTE: Consider implementing energy-saving mode
```

```
}
```

```
@Override
```

```
public void turnOff() {
```

```
    isOn = false;
```

```
    System.out.println("Fan turned OFF");
```

```
}
```

```
public void setSpeed(int speed) {
```

```

        this.speed = speed;

        System.out.println("Fan speed set to " + speed);

        // TODO: Allow users to set speed dynamically through voice commands
    }

    @Override
    public String getStatus() {
        return "Fan is " + (isOn ? "ON" : "OFF") + " at speed level " + speed;
    }
}

// Class representing a smart light, implementing SmartDevice interface
public class SmartLight implements SmartDevice {
    private boolean isOn; // Light power state
    private int brightness; // Brightness level

    public SmartLight() {
        this.isOn = false;
        this.brightness = 50; // Default brightness
    }

    @Override
    public void turnOn() {
        isOn = true;
        System.out.println("Light turned ON");
    }

    @Override
    public void turnOff() {

```



```
    isOn = false;

    brightness = 0; // Reset brightness

    System.out.println("Light turned OFF, brightness set to 0");

    // WARNING: Verify if the reset behavior aligns with user preferences
}
```

```
public void setBrightness(int brightness) {
    if (isOn) {
        this.brightness = brightness;

        System.out.println("Brightness set to " + brightness + "%");
    } else {
        System.out.println("Cannot adjust brightness, light is OFF!");

        // FIXME: Add a feature to remember last brightness setting when turned off
    }
}
```

```
@Override
public String getStatus() {
    return "Light is " + (isOn ? "ON with brightness " + brightness + "%" : "OFF with brightness 0%");
}
}
```

// Class representing smart temperature control, implementing SmartDevice interface

```
public class SmartTemperatureControl implements SmartDevice {

    private int temperature; // Current temperature setting

    private boolean isACOn; // Air Conditioner state

    private boolean isHeaterOn; // Heater state

    public SmartTemperatureControl() {
```

```
this.temperature = 24; // Default temperature setting

this.isACOn = false;

this.isHeaterOn = false;
}

@Override

public void turnOn() {
    System.out.println("Temperature control system turned ON.");
    // TODO: Log temperature changes for analytics
}

@Override

public void turnOff() {
    System.out.println("Temperature control system turned OFF.");
    isACOn = false;
    isHeaterOn = false;
}

public void setTemperature(int temperature) {
    this.temperature = temperature;
    System.out.println("Temperature set to " + temperature + "°C");
    adjustTemperatureControl();
}

private void adjustTemperatureControl() {
    if (temperature < 18) {
        isACOn = false;
        isHeaterOn = true;
        System.out.println("Heater turned ON to maintain warmth.");
    }
}
```

```
        // FIXME: Ensure heater does not overheat small spaces
    } else if (temperature > 26) {
        isACOn = true;
        isHeaterOn = false;
        System.out.println("Air Conditioner turned ON to cool down.");
    } else {
        isACOn = false;
        isHeaterOn = false;
        System.out.println("Temperature is within a comfortable range.");
    }
}
```

```
@Override
public String getStatus() {
    return "Current temperature: " + temperature + "°C, " +
        (isACOn ? "AC is ON" : "AC is OFF") + ", " +
        (isHeaterOn ? "Heater is ON" : "Heater is OFF");
}
}
```

```
// Main class handling smart home automation functionality
public class SmartHome {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        SmartLight light = new SmartLight();
        SmartFan fan = new SmartFan();
        SmartDoorLock doorLock = new SmartDoorLock();
        SmartTemperatureControl tempControl = new SmartTemperatureControl();
    }
}
```

```
while (true) {  
    System.out.println("\nSmart Home Automation System");  
    System.out.println("1. Turn ON/OFF Light");  
    System.out.println("2. Adjust Light Brightness");  
    System.out.println("3. Turn ON/OFF Fan");  
    System.out.println("4. Adjust Fan Speed");  
    System.out.println("5. Lock/Unlock Door");  
    System.out.println("6. Set Room Temperature");  
    System.out.println("7. View Device & Temperature Status");  
    System.out.println("8. Exit");  
    System.out.print("Enter your choice: ");  
  
    int choice = scanner.nextInt();  
    scanner.nextLine(); // Consume newline  
  
    switch (choice) {  
        case 1:  
            System.out.print("Turn Light ON (1) or OFF (0): ");  
            int lightChoice = scanner.nextInt();  
            if (lightChoice == 1) light.turnOn();  
            else light.turnOff();  
            break;  
        case 2:  
            System.out.print("Enter brightness (0-100): ");  
            int brightness = scanner.nextInt();  
            light.setBrightness(brightness);  
            break;  
        case 3:
```

```
        System.out.print("Turn Fan ON (1) or OFF (0): ");

        int fanChoice = scanner.nextInt();

        if (fanChoice == 1) fan.turnOn();

        else fan.turnOff();

        break;

    case 4:

        System.out.print("Enter fan speed (1-5): ");

        int speed = scanner.nextInt();

        fan.setSpeed(speed);

        break;

    case 5:

        System.out.print("Lock Door (1) or Unlock Door (0): ");

        int lockChoice = scanner.nextInt();

        if (lockChoice == 1) doorLock.lock();

        else doorLock.unlock();

        break;

    case 6:

        System.out.print("Enter desired temperature (°C): ");

        int temp = scanner.nextInt();

        tempControl.setTemperature(temp);

        break;

    case 7:

        System.out.println(light.getStatus());

        System.out.println(fan.getStatus());

        System.out.println(doorLock.getStatus());

        System.out.println(tempControl.getStatus());

        break;

    case 8:

        System.out.println("Exiting system.");
```

```

        scanner.close();

        System.exit(0);

    default:

        System.out.println("Invalid choice! Try again.");

    }

}

}

}

import java.util.Scanner;

// WARNING: Make sure to implement error handling for invalid user input!
// TODO: Integrate voice control for easier smart home interaction

// Main class handling smart home automation functionality
public class SmartHome {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        // Creating instances of smart home devices
        SmartLight light = new SmartLight();
        SmartFan fan = new SmartFan();
        SmartDoorLock doorLock = new SmartDoorLock();
        SmartTemperatureControl tempControl = new SmartTemperatureControl();

        while (true) {

            // NOTE: This menu provides interactive control for various smart home devices
            System.out.println("\nSmart Home Automation System");

            System.out.println("1. Turn ON/OFF Light");
            System.out.println("2. Adjust Light Brightness");

```

```
System.out.println("3. Turn ON/OFF Fan");
System.out.println("4. Adjust Fan Speed");
System.out.println("5. Lock/Unlock Door");
System.out.println("6. Set Room Temperature");
System.out.println("7. View Device & Temperature Status");
System.out.println("8. Exit");
System.out.print("Enter your choice: ");

int choice = scanner.nextInt();
scanner.nextLine(); // Consume newline

// Handling user's choice using a switch-case structure
switch (choice) {
    case 1:
        System.out.print("Turn Light ON (1) or OFF (0): ");
        int lightChoice = scanner.nextInt();
        if (lightChoice == 1) light.turnOn();
        else light.turnOff();
        // TODO: Implement automatic light control based on time of day
        break;
    case 2:
        System.out.print("Enter brightness (0-100): ");
        int brightness = scanner.nextInt();
        light.setBrightness(brightness);
        break;
    case 3:
        System.out.print("Turn Fan ON (1) or OFF (0): ");
        int fanChoice = scanner.nextInt();
        if (fanChoice == 1) fan.turnOn();
```

```
        else fan.turnOff();

        break;

case 4:

    System.out.print("Enter fan speed (1-5): ");

    int speed = scanner.nextInt();

    fan.setSpeed(speed);

    // FIXME: Validate speed input to prevent out-of-range values

    break;

case 5:

    System.out.print("Lock Door (1) or Unlock Door (0): ");

    int lockChoice = scanner.nextInt();

    if (lockChoice == 1) doorLock.lock();

    else doorLock.unlock();

    // WARNING: Consider adding logs for security tracking of door unlock events

    break;

case 6:

    System.out.print("Enter desired temperature (°C): ");

    int temp = scanner.nextInt();

    tempControl.setTemperature(temp);

    break;

case 7:

    // Display status of all smart home devices

    System.out.println(light.getStatus());

    System.out.println(fan.getStatus());

    System.out.println(doorLock.getStatus());

    System.out.println(tempControl.getStatus());

    break;

case 8:

    System.out.println("Exiting system.");
```



```
        scanner.close();

        System.exit(0); // End program execution
    default:

        System.out.println("Invalid choice! Try again.");

        // TODO: Implement input validation and error handling for incorrect choices
    }
}
}
```

## **GITHUB REPOSITORY**

<https://github.com/mt-0301/Assingment2>