

Intelligent Home Monitoring System

User Manual

1. Project Purpose

The Intelligent Home Monitoring System (IHMS) is a prototype application for monitoring smart home devices and their energy usage. It is designed to help users understand which devices are active, how much power they are using, how long they have been running, and when a device may require attention.

The system includes a dashboard, device cards, usage charts, runtime tracking, alert simulations, timers, and an emergency killswitch feature. For the capstone demo, the project uses demo device data and simulated monitoring behavior.

2. Intended Users

IHMS is designed for:

- Homeowners who want a simple view of connected household devices
- Small business owners who want to monitor appliances or office electronics
- Energy-conscious users who want to understand and reduce power usage

The current version is a prototype and is intended for demonstration, testing, and future development rather than production smart-home control.

3. Getting Started

After opening the application, users can log in or sign up using the demo authentication screens. Once authenticated, the main dashboard appears.

The sidebar provides navigation to the main areas of the application:

- Devices dashboard
- Add Device page
- Settings page

The dashboard is the primary workspace for monitoring device activity.

4. Dashboard Overview

The dashboard displays a summary of the monitored environment.

At the top of the dashboard, users can view:

- Total Power
- Active Devices
- Total Devices

Below the summary cards, the dashboard displays device cards for each connected device.

Each device card shows important information such as:

- Device name
- Device type
- Current on/off status

- Current power usage
- Alert state if the device has unusual activity

5. Viewing Total Power Usage

The Total Power card shows the combined wattage of all currently active devices.

For example, if a TV is using 120W and a washer is using 450W, the total power value will include both active devices.

This number helps users quickly understand the current energy load of the home or workspace.

6. Viewing Active Devices

The Active Devices card shows how many devices are currently turned on.

A device is considered active when its status is on.

This allows users to quickly check whether unexpected devices are running.

7. Viewing Total Devices

The Total Devices card shows the total number of devices currently registered in the system.

This includes both active and inactive devices.

8. Opening a Device Detail Modal

To view more information about a device:

1. Go to the dashboard.
2. Find the device card.
3. Click the device card.

A device detail modal will open.

The modal includes:

- Device name
- Current status
- Current power consumption
- Runtime counter
- Energy usage chart
- Usage trend information
- Alert messages when applicable

9. Reading Usage Charts

Inside the device detail modal, users can view energy usage charts.

The chart section includes selectable time ranges:

- Week
- Month
- 6 Months

- Year

The bars represent estimated or recorded energy usage in kilowatt-hours.

For the current prototype, usage history is simulated for demo purposes. In a future production version, this data would come from real smart plugs, IoT sensors, or energy monitoring hardware.

10. Adding a Device

To add a new device:

1. Click the Add Device option in the sidebar or the plus button on the dashboard.
2. Enter a device name.
3. Select a device type.
4. Click Pair Device.
5. Wait for the pairing animation to complete.

After pairing, the system returns to the dashboard and the new device appears in the device list.

11. Setting a Timer

Some device cards include a timer option.

To set a timer:

1. Open the timer control for a device.
2. Select the desired duration.
3. Confirm the timer.

The timer is associated with the selected device. When the timer reaches zero, the system displays a notification that the device session has ended.

Timers are useful for limiting how long a device should remain active, such as a gaming console, appliance, or entertainment device.

12. Runtime Tracking

Runtime tracking shows how long a device has been active.

When a device is on, the runtime counter increases over time. When the device is off, the runtime display resets or shows that the device is not active.

Runtime tracking helps users identify devices that may have been left running longer than expected.

13. Alerts

IHMS includes alert behavior for demo and monitoring purposes.

Alerts may appear when:

- A device has high energy usage
- A device has been running too long
- A gaming session exceeds a recommended time
- A simulated device turns on

Alerts are displayed as large notifications and may also appear visually on device cards or in the device detail modal.

For the prototype, some alerts are simulated through demo controls. In a production version, alerts would be triggered by real device telemetry and user-defined thresholds.

14. Killswitch

The killswitch is an emergency shutoff feature.

When activated, the killswitch turns all devices off in the system and resets active alerts, high-usage states, timers, and runtime values.

This feature is intended to demonstrate how a user could quickly stop all monitored devices during an emergency or when leaving a location.

In the current prototype, the killswitch updates application and database state. It does not control physical appliances.

15. Best Practices for Using the System

For the best experience:

- Check the dashboard regularly for active devices.
- Use timers for devices that should not run indefinitely.
- Review alerts when they appear.
- Open device details to inspect power and runtime behavior.
- Use the killswitch only when all devices should be turned off.
- Confirm backend and database connectivity before a live demo.

16. Limitations of the Current Prototype

The current IHMS version is a capstone prototype. Important limitations include:

- Device readings are simulated or manually updated.
- No physical smart plug or IoT hardware is connected.
- Authentication is demo-level and not production security.
- Energy history may be randomized for presentation purposes.
- The killswitch does not control real electrical devices.
- Advanced user roles and permissions are not implemented.
- Long-term historical analytics are limited.
- The system currently focuses on core monitoring and demo functionality.

These limitations are expected for the current project stage and provide clear opportunities for future development.

17. Future Improvements

Possible future improvements include:

- Connect real IoT smart plugs or sensors.
- Add secure production authentication.
- Add user accounts with separate households or businesses.
- Store real historical energy usage over time.
- Add customizable alert thresholds.

- Add notifications by email, SMS, or mobile push.
- Add cost estimates based on electricity rates.
- Add device categories and room-based organization.
- Add charts for daily, weekly, and monthly cost comparisons.
- Add machine learning to detect unusual usage patterns.
- Add real remote shutoff support through compatible hardware.