

SafeHome System User Manual

CS350 Team 9 ? December 2025 Release

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1. Overview

SafeHome unifies security, surveillance, and configuration management across a desktop control panel and a web dashboard. This manual documents the keypad-only login workflow introduced in December 2025 and summarizes day-to-day operations.

Key highlights:

- Away/Stay/Disarmed modes with intelligent intrusion detection.
- Floor-plan sensors, camera thumbnails, and historical activity logs.
- Dual interfaces (Tkinter Control Panel + Flask web dashboard) with two-factor web login.
- Structured storage (SQLite) plus comprehensive event logging.

2. System Requirements

- OS: Windows 10+, macOS, or Linux with Python 3.8+ (Tkinter included).
- Dependencies: `pip install -r requirements.txt`.
- Assets: `virtual_device_v4` folder must remain in the repository for keypad/camera resources.
- Database: write permission for `safehome.db` in project root.

3. Installation

1. 1. Clone or unzip SafeHome_team9.
2. 2. Optionally create & activate a Python virtual environment.
3. 3. Install dependencies using `pip install -r requirements.txt`.
4. 4. Run `python main.py`. The Tkinter main window and Control Panel keypad window will appear.

SafeHome automatically appends the correct virtual-device path to sys.path, so keypad and camera modules load without manual configuration.

4. Getting Started

5. On the PowerOff screen, click ?Turn On? to initialize database, controllers, and log manager.
6. After initialization, the Login screen appears while the Control Panel keypad window stays on top.
7. All credential input now comes from the keypad window to match the hardware flow.

4.1 Control Panel Keypad Basics

- Digits 0-9: enter characters. User ID entry uses telephone multi-tap (2?a/b/c, 3?d/e/f, etc.).
- `*`: backspace in whichever field is active (user ID or password).
- `#`: confirm the current field. After user ID, it switches to password entry; during password, it submits login.
- LED indicators: power (availability), armed (successful login), not-ready (panel locked).

Multi-tap mapping table:

Key	Characters
1	1
2	a b c 2
3	d e f 3
4	g h i 4
5	j k l 5
6	m n o 6
7	p q r s 7
8	t u v 8
9	w x y z 9
0	0

Example (default admin): `2` (a) ? `3` (d) ? `6` (m) ? `4` press 3 times (i) ? `6` press twice (n) ? `#` to confirm user ID ? enter digits `1 2 3 4` ? `#` to submit login.

4.2 Default Credentials

Control Panel: user `admin`, password `1234`. After success, the keypad displays ?Access granted? and the Main Menu opens.

Web Browser: <http://127.0.0.1:5000> ? enter the same first password then the configured second password/PIN.

5. Daily Operations

Security Modes

- Stay Mode?perimeter sensors armed; interior motion idle.
- Away Mode?all sensors armed with entry delay before alarms.
- Disarmed?sensors idle though logs still capture events.

Safety Zones

- Add/rename/delete zones from the Zones view.
- Assign sensors to zones; assignments show in the table and keypad.

Surveillance

- Modes view offers camera thumbnails, live panels, and pan/zoom controls.
- Camera passwords and enable/disable toggles reside within the same view.

Configuration & Logs

- Settings presenter manages monitoring/homeowner phone numbers, lock time, and alarm delay.
- Log manager records alarms, intrusions, panic events, and administrative changes.

6. Troubleshooting & FAQs

- Keypad window closed/minimized ? reopen from taskbar; the app keeps one instance alive.
- Cannot enter letters ? multi-tap the same digit quickly; pausing resets to the first letter.
- Panel locked after failed attempts ? wait for the configured lock timer or unlock via admin action.
- Camera thumbnails blank ? ensure `virtual_device_v4` assets exist (path auto-added).
- Web 2nd-factor failures ? reset both passwords via Control Panel Settings ? Change Password.
- Need diagnostics ? run `pytest` (630 passing tests) to validate the installation.

Appendix: Legacy Reference (Unchanged Details)

1.3 System Architecture

SafeHome consists of several integrated components:

Authentication System: User login and access control (Control Panel and Web Browser)

Security System: Core security logic, alarm management, and zone control

Surveillance System: Camera management and video feed handling

Configuration Manager: System settings and safety zone management

Storage Manager: Database persistence for users, settings, and logs

Event Logging: Comprehensive audit trail of all system events

1.4 Use Cases

SafeHome is designed for homeowners who need:

Reliable home security monitoring

Remote access to security controls

Flexible security zone management

Comprehensive surveillance capabilities

Easy-to-use interface for daily operations

2. System Requirements

2.1 Hardware Requirements

Minimum Requirements

Processor: Intel Core i3 or equivalent (1.6 GHz or higher)

Memory: 4 GB RAM

Storage: 500 MB available disk space

Display: 1024 x 768 resolution or higher

Network: Internet connection for web interface (optional, local network also supported)

Recommended Requirements

Processor: Intel Core i5 or equivalent (2.4 GHz or higher)

Memory: 8 GB RAM or higher

Storage: 1 GB available disk space

Display: 1920 x 1080 resolution or higher

Network: Stable broadband connection for remote access

Optional Hardware

Sensors: Window/Door sensors, Motion detectors (simulated in current version)

Cameras: IP cameras or compatible camera devices (simulated in current version)

Siren: External alarm siren device (simulated in current version)

2.2 Software Requirements

Operating System

Windows: Windows 10 or later (64-bit recommended)

macOS: macOS 10.14 (Mojave) or later

Linux: Ubuntu 20.04 LTS or later, or equivalent Linux distribution

Required Software

Python: Version 3.10 or higher (3.11 recommended)

Python 3.11 is used in CI/CD and tested environments

Python can be downloaded from python.org

Web Browser (for web interface):

Google Chrome 90+ (recommended)

Mozilla Firefox 88+

Microsoft Edge 90+

Safari 14+ (macOS)

Python Dependencies

The following Python packages are automatically installed when you install SafeHome:

Flask ($\geq 2.3.0$): Web framework for the web interface

Pillow ($\geq 10.0.0$): Image processing for camera feeds

pytest ($\geq 7.4.0$): Testing framework (for development)

requests ($\geq 2.31.0$): HTTP library (for API testing)

All dependencies are listed in `requirements.txt` and will be installed automatically during setup.

2.3 Network Requirements

For Local Control Panel

No network connection required for basic operation

System runs entirely on local machine

For Web Interface

Local Access: Works on localhost (127.0.0.1) - no external network needed

Remote Access: Requires network configuration:

Port 5000 must be available (default Flask port)

Firewall rules may need to be configured

Router port forwarding may be required for external access

Network Ports

Port 5000: Web interface HTTP (default)

Database: SQLite (local file, no network port needed)

2.4 Database Requirements

SafeHome uses SQLite database, which requires:

No additional database server installation needed

Database file (safehome.db) created automatically

Sufficient disk space for log storage (grows with system usage)

2.5 Security Considerations

Before installing and using SafeHome:

Account Security

Use strong passwords (minimum requirements enforced by system)

Change default passwords immediately after installation

Do not share login credentials

Enable account lockout protection (enabled by default)

Network Security (if using web interface remotely)

Use HTTPS in production environments (not included in default setup)

Configure firewall rules appropriately

Regularly update system and dependencies

Monitor access logs for suspicious activity

Physical Security

Secure access to the control panel computer

Limit physical access to system hardware

Regular backup of system database

2.6 Browser Compatibility

The web interface has been tested and verified to work with:

Browser

Minimum Version

Status

Google Chrome

Mozilla Firefox

Microsoft Edge

Safari

Opera

Internet Explorer

90+

88+

90+

14+

76+

-

2.7 System Limitations

Current Version Limitations

Fully Supported

Fully Supported

Fully Supported

Fully Supported

⚠ May have minor display issues

Not Supported

Simulated Devices: Current version uses simulated sensors and cameras for demonstration

Single User Session: One active session per user account at a time

Local Network Only: Web interface defaults to localhost (external access requires configuration)

No HTTPS: Default web interface uses HTTP (not suitable for production without additional configuration)

Single Database: SQLite database supports single concurrent write operation

Performance Considerations

System performance depends on number of active cameras and sensors

Large log files may slow down system queries

Web interface updates every 15 seconds (configurable in code)

3. Installation

3.1 Prerequisites

Before installing SafeHome, ensure you have:

. Python 3.10 or higher installed on your system

Check Python version: `python --version` or `python3 --version`

If not installed, download from [python.org](https://www.python.org)

Important: During Python installation on Windows, check "Add Python to PATH"

. pip (Python package installer)

Usually comes with Python installation

Verify: pip --version or pip3 --version

. Git (optional, for cloning the repository)

Download from git-scm.com

3.2 Installation Steps

Step 1: Obtain SafeHome Source Code

Option A: Clone from Repository

```
git clone [https://github.com/jien040708/SafeHome_team9.git]  
cd SafeHome_team9
```

Option B: Extract from ZIP File

Extract the ZIP file to your desired location

Navigate to the extracted folder in terminal/command prompt

Step 2: Create Virtual Environment (Recommended)

Creating a virtual environment isolates SafeHome dependencies:

```
# Windows  
python -m venv venv  
venv\Scripts\activate
```

```
# macOS/Linux  
python3 -m venv venv  
  
source venv/bin/activate
```

Step 3: Install Dependencies

Install required Python packages:

```
# Windows  
pip install -r requirements.txt  
  
# macOS/Linux  
pip3 install -r requirements.txt
```

This will install:

Flask (\geq 2.3.0)

Pillow (\geq 10.0.0)

pytest (\geq 7.4.0)

requests (\geq 2.31.0)

pytest-cov

Step 4: Database Setup

The database will be created automatically on rst run. However, if you need to migrate an existing

database:

python common/migrate_database.py

Step 5: Create Web User Account (Optional)

To use the web interface, create a web user account:

python common/create_web_user.py

This creates a default web user:

Username: homeowner

First Password: first123

Second Password: second456

Δ Important: Change these default passwords immediately after rst login!

3.3 Verify Installation

To verify the installation:

. Check Python packages:

pip list

Ensure Flask, Pillow are installed.

. Run a test (optional):

python -m pytest tests/ --version

3.4 Installation Troubleshooting

Problem: "Python not found"

Solution:

Ensure Python is installed and added to PATH

On Windows, reinstall Python with "Add Python to PATH" checked

Try using `python3` instead of `python` on macOS/Linux

Problem: "pip is not recognized"

Solution:

Update pip: `python -m ensurepip --upgrade`

Or use: `python -m pip install -r requirements.txt`

Problem: Permission denied during installation

Solution:

On Windows: Run Command Prompt as Administrator

On macOS/Linux: Use `sudo` (not recommended) or use virtual environment

Problem: `ModuleNotFoundError` after installation

Solution:

Verify virtual environment is activated

Reinstall dependencies: `pip install -r requirements.txt --force-reinstall`

4. Getting Started

4.1 First Launch

Starting the System

. Open Terminal/Command Prompt

Windows: Press `Win + R`, type `cmd`, press Enter

macOS: Open Terminal from Applications

Linux: Open Terminal

. Navigate to SafeHome Directory

`cd path/to/SafeHome_team9`

. Activate Virtual Environment (if you created one)

```
# Windows  
venv\Scripts\activate  
  
# macOS/Linux  
source venv/bin/activate  
  
. Start SafeHome  
  
python main.py
```

You should see:

```
=====  
SafeHome Control Panel Started  
System Status: OFF (Press 'Turn On' to start)  
Web Interface: http://localhost:5000  
=====
```

Two windows will appear:

Control Panel Window (Tkinter GUI) - Main interface
Web Server running in background (accessible via browser)

4.2 Initial Setup

Step 1: Turn On the System (Control Panel)

- . The Control Panel window shows "System is OFF"
- . Click the "Turn On" button
- . Wait for system initialization (progress bar will show status)
- . When complete, you'll see the Login screen

Step 2: Login to Control Panel

- . Enter your credentials:

Default Username: admin

Default Password: 1234

- . Click "Login"
- . You'll be taken to the Main Menu

Step 3: Change Default Password (Recommended)

- . From Main Menu, navigate to "CONFIGURE" → "System Control" tab
- . Click "Change Password"
- . Enter old password: 1234
- . Enter new password (follow password requirements)
- . Conrm new password
- . Click "Change Password"

Step 4: Access Web Interface (Optional)

- . Open your web browser
- . Navigate to: <http://localhost:5000>
- . You'll be redirected to the login page

. Enter web credentials:

Username: homeowner

First Password: first123

Second Password: second456

⚠ Change these default passwords immediately!

4.3 System Overview

After successful login, you have access to:

Control Panel Features:

SECURITY: Manage safety zones

SURVEILLANCE: Congure security modes (Arm Away, Arm Stay, Disarm)

CONFIGURE: System settings, change password, intrusion logs

Web Interface Features:

Dashboard: Quick status overview and control buttons

Arm Away/Stay: Set security modes

Disarm: Deactivate security

Panic Alarm: Emergency alarm trigger

Configure Settings: System configuration

Surveillance: Camera viewing

Zone Management: Safety zone configuration

4.4 Quick Start Checklist

Python 3.10+ installed

Dependencies installed (pip install -r requirements.txt)

System started (python main.py)

System turned on (Control Panel)

Logged into Control Panel

Changed default passwords

Web interface accessed (optional)

Reviewed system settings

5. User Guide

5.1 Control Panel Interface

The Control Panel provides the primary interface for system management. It includes several pages

accessed through navigation.

5.1.1 Power Off Screen

Purpose: Initial screen when system is off

Features:

System status indicator (OFF)

"Turn On" button to start the system

Progress bar during initialization

How to Use:

- . Click "Turn On" button

- . Wait for initialization (progress bar shows steps)
- . System automatically transitions to Login screen when ready

Status Messages:

"System is OFF" - Ready to start

"Starting system..." - Initialization in progress

"Ready" - System initialized and ready for login

5.1.2 Login Screen

Purpose: Authenticate to access system controls

Features:

Username and password input fields

Login button

Status messages for login attempts

How to Login:

- . Enter username (default: admin)
- . Enter password (default: 1234)
- . Click "Login" button

Login Behavior:

Successful login → Main Menu

Failed login → Error message displayed

Account lockout after 5 failed attempts (requires reset)

5.1.3 Main Menu

Purpose: Central hub for accessing all system functions

Menu Options:

SECURITY: Safety zone management

SURVEILLANCE: Security mode configuration

CONFIGURE: System settings and logs

LOGOUT: Exit to login screen

Turn Off System: Shutdown system

How to Navigate:

Click any menu button to access that section

Use "Back" buttons within each section to return to Main Menu

5.1.4 Security (Zones View)

Purpose: Create and manage safety zones, assign sensors

Features:

Visual floor plan with sensor locations

Zone creation and management

Sensor-to-zone assignment

Zone status indicators

Creating a Zone:

- . Navigate to SECURITY from Main Menu
- . Click "Create Zone" or use zone creation interface
- . Enter zone name (e.g., "Front Door Zone")
- . Confirm creation

Assigning Sensors to Zones:

- . View sensors listed on the screen
- . Select a sensor
- . Choose target zone from dropdown
- . Confirm assignment

Zone Indicators:

Green: Zone is armed and secure

Yellow: Zone is armed but sensor open

Red: Alarm condition in zone

Gray: Zone is not armed

5.1.5 Surveillance (Modes View)

Purpose: Configure security modes (Arm Away, Arm Stay, Disarm)

Features:

Security mode buttons

Current mode display

Armed zones indicator

Floor plan visualization

Security Modes:

Arm Away:

Full protection mode for when house is unoccupied

All sensors (doors, windows, motion) trigger alarms

Use when leaving home for extended period

Arm Stay:

Perimeter protection while occupants are inside

Only door/window sensors trigger alarms

Motion sensors inside are ignored

Use when staying home but want perimeter protection

Disarm:

System deactivated

No alarms triggered

Use during normal activity when security not needed

How to Set Mode:

. Navigate to SURVEILLANCE from Main Menu

. Click desired mode button:

"Arm Away" - Full protection

"Arm Stay" - Perimeter protection

"Disarm" - Deactivate

. Conrm mode change

. Current mode displays at top of screen

Mode Restrictions:

Cannot arm if doors/windows are open

System checks all sensors before arming

Error messages guide you to close sensors before arming

5.1.6 Congure (Monitoring View)

Purpose: System conuguration, password management, and log viewing

Three Tabs Available:

System Settings Tab

Purpose: Congure system parameters

Settings Available:

Monitoring Service Phone: Phone number for alarm monitoring

Homeowner Phone: Your contact number

System Lock Time: Auto-lock timeout (minutes)

Alarm Delay Time: Entry delay before alarm (seconds)

How to Congure:

. Navigate to CONFIGURE from Main Menu

. Select "System Settings" tab

. Enter or modify values in input elds

. Click "Save Settings"

. Conrmation message appears

Change Password Tab

Purpose: Update control panel password

How to Change Password:

- . Navigate to CONFIGURE from Main Menu
- . Select "Change Password" tab
- . Enter current password
- . Enter new password (follow requirements)
- . Conrm new password
- . Click "Change Password"
- . Success message appears

Password Requirements:

Minimum length enforced by system

Cannot be same as current password

Must meet complexity requirements

System Control Tab

Purpose: Reset system or control panel lock

Features:

Reset System: Clear all configurations (use with caution)

Unlock Control Panel: Release control panel if locked

How to Reset System:

- . Select "System Control" tab
- . Click "Reset System" button
- . Conrm reset action
- . System clears all settings and returns to default state

How to Unlock Control Panel:

- . If control panel is locked
- . Select "System Control" tab
- . Click "Unlock Control Panel" button

. Control panel is unlocked

Intrusion Log Section

Purpose: View historical security events

Features:

Chronological list of intrusion events

Event details (sensor, zone, time, action)

Automatic updates when new events occur

Log Entry Format:

[HH:MM:SS] ACTION at SENSOR_NAME (ZONE_NAME)

Example:

[14:23:15] Intrusion detected at Front Door (Zone 1)

[14:25:30] Alarm activated at Living Room Motion (Zone 2)

5.2 Web Interface

The web interface provides remote access to SafeHome through any web browser. It uses a two-step

authentication process for enhanced security.

5.2.1 Accessing the Web Interface

URL: <http://localhost:5000>

For Remote Access:

Replace `localhost` with your computer's IP address

Example: <http://192.168.1.100:5000>

Ensure firewall allows port 5000

5.2.2 Login Process

Two-Step Authentication:

Step 1: First Password

. Navigate to login page

- . Enter username (default: homeowner)
- . Enter rst password (default: first123)
- . Click "Login" button

Step 2: Second Password

- . If rst password is correct, second password screen appears
- . Enter second password (default: second456)
- . Click "Submit" button
- . Redirected to Dashboard upon success

Security Features:

5 failed attempts lock the account

Remaining attempts shown on error

Account lockout requires administrator unlock

All login attempts are logged

5.2.3 Dashboard

Purpose: Central control panel with quick access to all functions

Features:

Status Display:

Current Security Mode (Disarmed, Armed Away, Armed Stay)

Alarm Status (IDLE, DELAY, ACTIVE)

Real-time updates every 15 seconds

Main Control Buttons:

Arm Away: Set full protection mode

Arm Stay: Set perimeter protection mode

Disarm: Deactivate security system

Panic Alarm: Emergency alarm trigger

Secondary Control Buttons:

Congure Settings: System conuguration page

Surveillance: Camera viewing interface

Zone Management: Safety zone conuguration

Navigation:

Logout button (top right)

Welcome message with username

5.2.4 Security Controls

Arm Away Mode

Purpose: Full protection when house is unoccupied

How to Arm Away:

- . On Dashboard, click "Arm Away" button
- . Conrm action if prompted
- . System checks all sensors
- . If sensors are closed, system arms successfully
- . Status updates to "Armed Away"

Behavior:

All sensors trigger alarms (doors, windows, motion, cameras)

Entry delay before alarm activation (if conugured)

Immediate monitoring service notication on alarm

Arm Stay Mode

Purpose: Perimeter protection while inside

How to Arm Stay:

- . On Dashboard, click "Arm Stay" button
- . Conrm action if prompted
- . System checks perimeter sensors
- . If doors/windows are closed, system arms successfully

- . Status updates to "Armed Stay"

Behavior:

Only door/window sensors trigger alarms

Motion sensors inside are ignored

Camera snapshots trigger alarms

Entry delay applies

Disarm Mode

Purpose: Deactivate security system

How to Disarm:

- . On Dashboard, click "Disarm" button
- . System immediately disarms
- . Status updates to "Disarmed"
- . Any active alarms are cleared

Behavior:

All sensors ignored

No alarms triggered

System remains in Ready state

Panic Alarm

Purpose: Emergency alarm trigger

How to Trigger:

- . Click "Panic Alarm" button on Dashboard
- . Alarm activates immediately (no delay)
- . Siren sounds
- . Monitoring service notified immediately

Use Cases:

Medical emergency

Intruder present

Immediate danger requiring response

To Clear Panic Alarm:

Disarm the system

Or wait for authorized user to clear

5.2.5 Congure Settings

Purpose: System conuguration and settings management

Access: Click "Congure Settings" button on Dashboard

Available Settings:

Monitoring Service Phone:

Phone number for alarm monitoring service

Used when alarm is triggered

Format: Enter as string (e.g., "555-1234")

Homeowner Phone:

Your contact phone number

Used for notifications

Format: Enter as string

System Lock Time:

Auto-lock timeout in minutes

Account locks after inactivity

Default: 30 minutes

Range: 1-1440 minutes

Alarm Delay Time:

Entry delay before alarm activation (seconds)

Allows time to disarm after entry

Default: 30 seconds

Range: 0-300 seconds

How to Update Settings:

- . Navigate to Congure Settings page
- . Modify values in input elds
- . Click "Save Settings" button
- . Success message appears
- . Settings applied immediately

5.2.6 Surveillance Interface

Purpose: View and control cameras

Access: Click "Surveillance" button on Dashboard

Features:

Camera Selection:

Floor Plan View: Click camera icons on oor plan

Thumbnail View: Grid of all camera thumbnails

Camera List: Dropdown selection

Camera Controls:

Enable/Disable: Toggle camera on/off

Pan: Horizontal camera movement (left/right buttons)

Zoom: Camera zoom in/out (zoom in/out buttons)

Snapshot: Capture current frame

Viewing Options:

Single Camera View: Full-screen single camera

Multi-Camera View: Grid of multiple cameras

Live Feed: Real-time updates (1 frame per second)

How to View Camera:

- . Navigate to Surveillance page

- . Select camera from oor plan, thumbnail, or dropdown
- . Camera feed displays in main area
- . Use control buttons to pan/zoom
- . Click "Enable" or "Disable" to control camera

Camera Status Indicators:

Green: Camera enabled and active

Red: Camera disabled

Yellow: Camera error or connection issue

5.2.7 Zone Management

Purpose: Create and manage safety zones, assign sensors

Access: Click "Zone Management" button on Dashboard

Features:

Zone Management:

Create Zone: Add new safety zone

Rename Zone: Change zone name

Delete Zone: Remove zone (sensors reassigned)

Sensor Assignment:

View all sensors and their current zone assignments

Assign to Zone: Move sensor to different zone

Clear Assignment: Remove sensor from zone

How to Create Zone:

- . Navigate to Zone Management page
- . Enter zone name in "Create New Zone" section
- . Click "Create Zone" button
- . Zone appears in zones table

How to Assign Sensor:

- . Find sensor in "Sensors & Assignments" table
- . Select target zone from dropdown
- . Click "Assign" button
- . Assignment updates immediately

How to Delete Zone:

- . Find zone in zones table
- . Click "Delete" button for that zone
- . Confirm deletion
- . Zone removed, sensors become unassigned

5.3 System States

Understanding system states helps you know what the system is doing:

OFF: System is powered off, no functions available

INITIALIZING: System is starting up, components loading

READY: System is on and ready, awaiting login or commands

ACTIVE: System is armed and monitoring sensors

LOCKED: Control panel locked due to failed login attempts

SHUTDOWN: System is shutting down gracefully

5.4 Best Practices

Daily Operations:

Arm system when leaving home (Arm Away)

Use Arm Stay when staying home but want perimeter protection

Disarm when returning home

Check intrusion logs regularly

Security:

Change default passwords immediately

Use strong, unique passwords

Don't share login credentials

Review intrusion logs weekly

Maintenance:

Test system monthly (arm/disarm cycle)

Verify sensor status regularly

Check camera feeds periodically

Review and clean up old logs

Emergency Procedures:

Use Panic Alarm for immediate threats

Keep monitoring service phone number accessible

Know how to quickly disarm system

Test emergency procedures quarterly

6. Troubleshooting

6.1 Common Issues

System Won't Start

Symptoms:

Control Panel window doesn't appear

Error messages in terminal

"System not initialized" error

Solutions:

. Check Python Installation:

```
python --version
```

Should show Python 3.10 or higher

. Verify Dependencies:

```
pip list | grep Flask
```

```
pip list | grep Pillow
```

Both should be installed

. Check Database:

Ensure `safehome.db` file exists or can be created

Check file permissions in project directory

. Review Error Messages:

Read terminal output for specific errors

Common issues: Missing modules, port conflicts, permission errors

. Reinstall Dependencies:

```
pip install -r requirements.txt --force-reinstall
```

Login Issues

Problem: "Incorrect password" but password is correct

Solutions:

Ensure you're using correct username (case-sensitive)

Check if account is locked (5 failed attempts)

Try resetting password from Control Panel

Verify you're using correct interface (Control Panel vs Web)

Problem: "Account is locked"

Solutions:

For Control Panel:

. Use unlock script: `python common/unlock_admin_cp.py`

. Or unlock from CONFIGURE → System Control tab

For Web Interface:

. Use unlock script: `python common/unlock_account.py homeowner web_browser`

. Or manually update database (advanced users only)

Problem: "System not available" (Web Interface)

Solutions:

- . Ensure Control Panel application is running
- . Verify web server started (check terminal for "Web Interface: http://localhost:5000")
- . Check if port 5000 is available:

```
# Windows  
netstat -ano | findstr :5000
```

```
# macOS/Linux  
lsof -i :5000
```

- . Try restarting the system

Web Interface Not Accessible

Problem: Can't connect to http://localhost:5000

Solutions:

- . Check if Server is Running:

Look for "Web Interface: http://localhost:5000" in terminal

If not visible, restart main.py

- . Try Different Port:

If port 5000 is in use, modify main.py :

```
app.run(port=5001, debug=False, use_reloader=False)
```

Access via http://localhost:5001

- . Check Firewall:

Windows: Allow Python through Windows Firewall

macOS/Linux: Check firewall rules

- . Browser Issues:

Clear browser cache

Try different browser

Check for browser extensions blocking localhost

Cannot Arm System

Problem: "Cannot arm: door/window sensors are open"

Solutions:

- . Check sensor status on Zones view
- . Close all doors and windows
- . Wait for sensors to update (may take a few seconds)
- . Try arming again
- . If sensors show closed but still can't arm, check sensor assignments

Problem: "System not ready"

Solutions:

- . Ensure system is turned on (not OFF state)
- . Login to Control Panel rst
- . Check system status in terminal
- . Try turning system off and on again

Camera Issues

Problem: Camera feed not showing

Solutions:

- . Ensure camera is enabled (green status)
- . Check camera assignment in Zone Management
- . Verify virtual device directory exists
- . Try disabling and re-enabling camera
- . Check if camera image files exist in `virtual_device_v4/` directory

Problem: Camera controls not working

Solutions:

- . Ensure camera is enabled before using controls
- . Try refreshing the surveillance page
- . Check browser console for JavaScript errors
- . Ensure camera supports pan/zoom (some cameras may not)

Sensor Status Not Updating

Problem: Sensor shows incorrect status

Solutions:

- . Refresh the page or view
- . Check sensor assignment to zone
- . Verify sensor is activated in system
- . Try manually updating sensor status (if using virtual devices)
- . Check system logs for sensor errors

Database Errors

Problem: "Database connection failed" or "Table not found"

Solutions:

- . Check Database File:

Verify `safehome.db` exists in project root

Check file permissions

- . Run Migration Script:

`python common/migrate_database.py`

- . Recreate Database (⚠ This deletes all data):

Delete `safehome.db` file

Restart system (database will be recreated)

Recreate users and settings

- . Check Disk Space:

Ensure sufficient disk space for database

6.2 Error Messages

"System not initialized"

Meaning: System hasn't been turned on yet

Solution:

- . Open Control Panel
- . Click "Turn On" button
- . Wait for initialization to complete

"Login required"

Meaning: You're not logged in or session expired

Solution:

- . Login to Control Panel or Web Interface
- . If session expired, login again

"Port 5000 already in use"

Meaning: Another application is using port 5000

Solution:

- . Close other applications using port 5000
- . Or change port in main.py :

```
app.run(port=5001, debug=False, use_reloader=False)
```

"ModuleNotFoundError: No module named 'X'"

Meaning: Missing Python package

Solution:

```
pip install -r requirements.txt
```

"Permission denied"

Meaning: Insufficient permissions

Solution:

Check file/directory permissions

Run as administrator (Windows) or with sudo (Linux) if needed

Or x permissions on project directory

6.3 Performance Issues

System Running Slowly

Solutions:

. Reduce Log Size:

Clear old intrusion logs

Archive or delete old event logs

. Check Active Processes:

Ensure only one SafeHome instance is running

Close unnecessary applications

. Database Optimization:

Database grows over time, consider archiving old data

Recreate database if it becomes too large

. Reduce Camera Count:

Disable unused cameras

Limit concurrent camera views

Web Interface Slow to Load

Solutions:

. Check network connection

. Reduce number of active cameras

. Clear browser cache

. Check browser console for errors

. Try different browser

6.4 Getting Help

If you encounter issues not covered here:

. Check Logs:

Control Panel terminal output

Browser console (F12 → Console tab)

System event logs

. Review Documentation:

This User Manual

Technical documentation in docs/ folder

README files in project

. Common Scripts:

common/check_account_status.py - Check user account status

common/unlock_account.py - Unlock locked accounts

common/reset_all_accounts.py - Reset all accounts (use with caution)

. Support Resources:

Project repository issue tracker

Documentation in docs/ folder

Contact development team

Appendices

Appendix A: Default Accounts

After initial setup, the following default accounts are available:

Control Panel:

Username: admin

Password: 1234 (must be changed on first login)

Web Interface:

Username: homeowner

First Password: first123

Second Password: second456

⚠ Security Note: Change these default passwords immediately after installation!

Appendix B: Contact Information

For technical support or questions about SafeHome:

Project Repository: [GitHub Repository URL]

Documentation: See docs/ folder in project directory

Issue Reporting: Use project issue tracker

Document Version: 1.0

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