

Using LLMs for UML diagram

Summary

- StarUML-mcp: a software engineering tool for system modeling using the Unified Modeling Language
 - Strength
 - Easy to setup
 - Directly make UML diagram
 - Can be good starting point
 - Weakness
 - Does not make good quality UML diagram

Summary

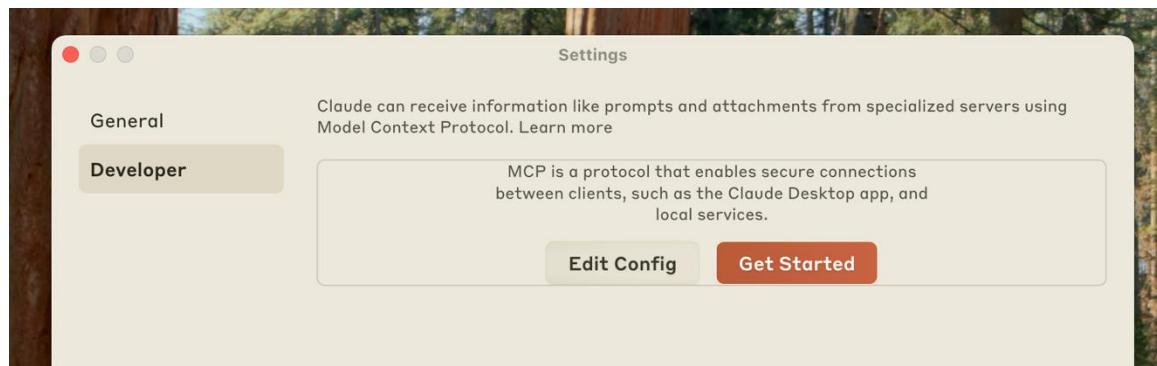
- ChatGPT, Gemini2.5-pro
 - Does not generate good diagram image
 - Does not generate good UML diagram code
 - Asks to generate PlantUML code
 - PlantUML: language to draft various types of diagrams

StarUML

- supports integration with AI service
 - Claude Desktop – I used Claude Desktop
 - Cursor
 - etc.
- Prerequisite:
 - StarUML: v.7.0.0 or higher
 - Node.js: v22 or higher

Setup

- Set up `claude_desktop_config.json` in Claude Desktop
 - <https://github.com/staruml/staruml-mcp-server>
 - <https://modelcontextprotocol.io/docs/develop/connect-local-servers>

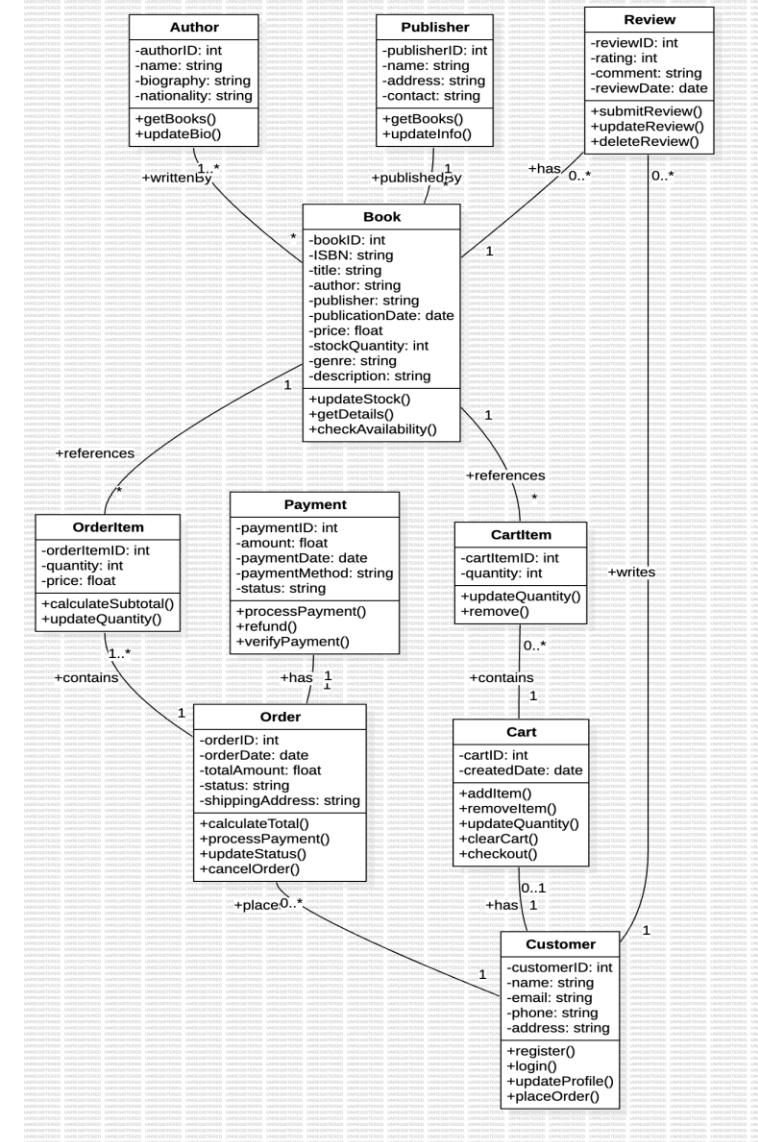


Set up `claude_desktop_config.json` in Claude Desktop as follows:

```
{  
  "mcpServers": {  
    "staruml-mcp-server": {  
      "command": "npx",  
      "args": ["-y", "staruml-mcp-server"]  
    }  
  }  
}
```

StarUML with MCP Example

- Prompt:
I'll create a class diagram for a bookstore system in StarUML. Let me generate a comprehensive diagram that includes the main entities and their relationships.
- Then Claude Desktop generates following class diagram on StarUML right away.



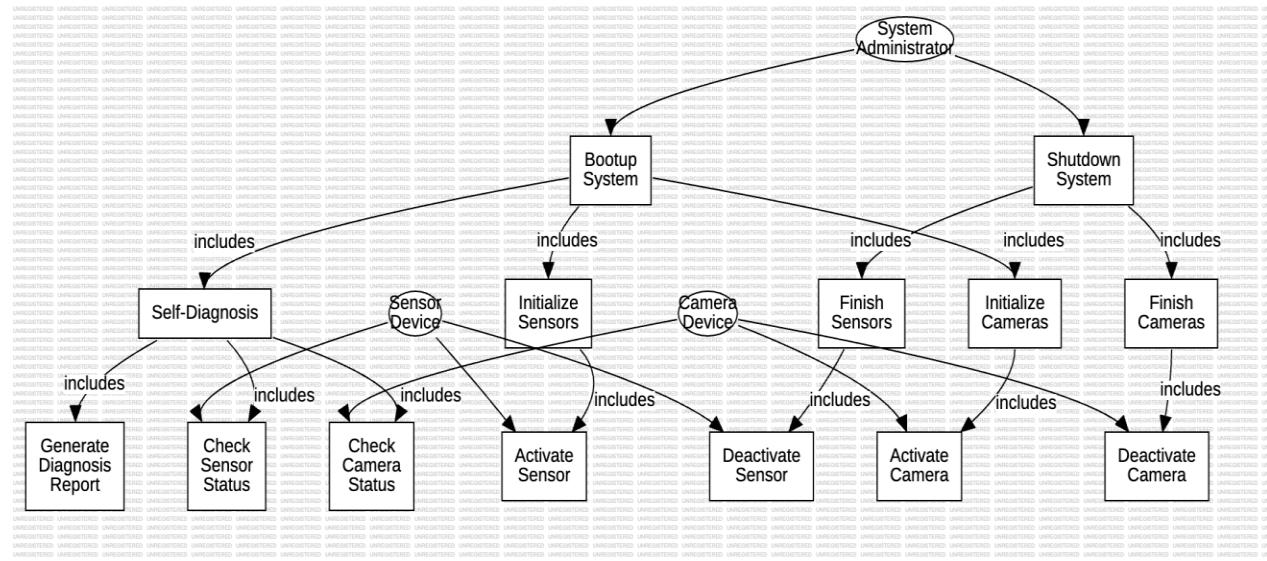
SafeHome Product: direct prompt

- Give functional requirement directly and asks to generate use case diagram

- **Prompt:**

Please analyze this functional requirement and draw use case diagram

1. SafeHome bootup/shutdown service
 - A. Self-diagnosis – check whether connected sensors and cameras are ok.
 - B. Initialize/finish sensors C. Initialize/finish cameras



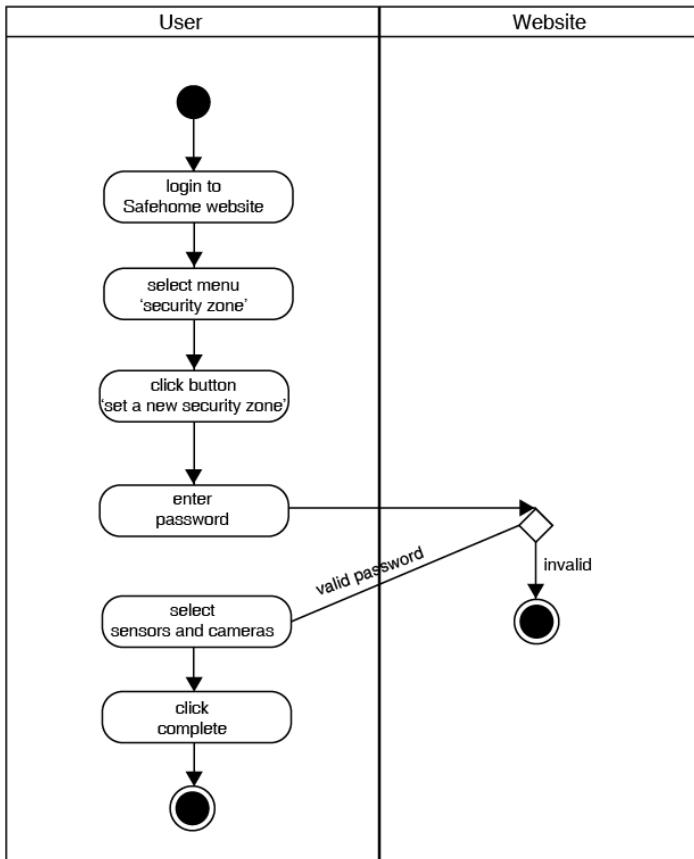
Generated Use Case Diagram

SafeHome Product: with detailed description

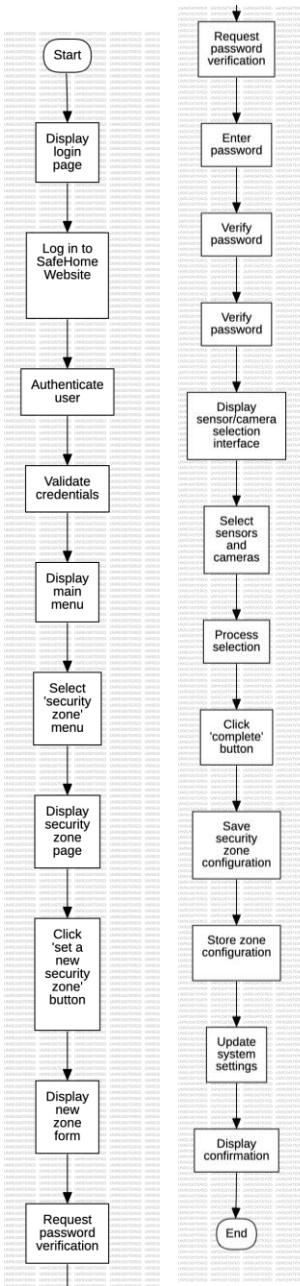
- Provide following use case description and asks to generate Swimlane diagram
- Prompt:
Please draw Swimlane diagram according to following use case definition.

3.2.1. Set security zone	
Use Case Code	UC1
Use Case Name	Set security zone
Related Requirements	FR1.1
Created By	Koo Yoonpyo
Created At	May 5 th 2015
Last Modified By	Koo Yoonpyo
Last Modified At	May 5 th 2015
Primary actor	User
Goal in context	User sets security zone which comprise any set of sensors and cameras.
Preconditions	1. Safehome system is installed in user's home.
Trigger	User decides to set a security zone.
Scenario	1. User logs in to Safehome Website. 2. User selects 'security zone' menu. 3. User clicks 'set a new security zone' button. 4. User enters password one more time. 5. User selects sensors and cameras that user wants. 6. User Click 'complete' button.
Exceptions	N/A
Priority	High
Frequency of use	Low
Channel to actor	Safehome Website

Result



Original Swimlane Diagram



Generated Swimlane Diagram

SafeHome Product: with detailed description

- Provide following use case description and asks to generate use case diagram
- Prompt:
Please draw use case diagram according to following use case definition.

Table 1 – Stimulus/Response Sequences for “Secure the house” feature

Stimulus:	Home owner requests to arm the system.
Response:	If the house condition is normal and the user is valid, the system activates the sensors and motion detectors.
Stimulus:	Home owner requests help in panic cases
Response:	The system alarms and informs the monitoring company
Stimulus:	Danger is detected (intruder breaks into the house or fire, CO, smoke, basement water level is reported to be dangerous)
Response:	The system alarms and informs the monitoring company
Stimulus:	Home owner or monitoring company resolves the security alarm events and requests the alarm to be off
Response:	If the requesting user is valid, the system turns the alarm off.
Stimulus:	Home owner requests to disarm the system.
Response:	If the house condition is armed and the user is valid, the system deactivates the sensors and motion detectors.

Result

3.1.3 Use Case Diagram

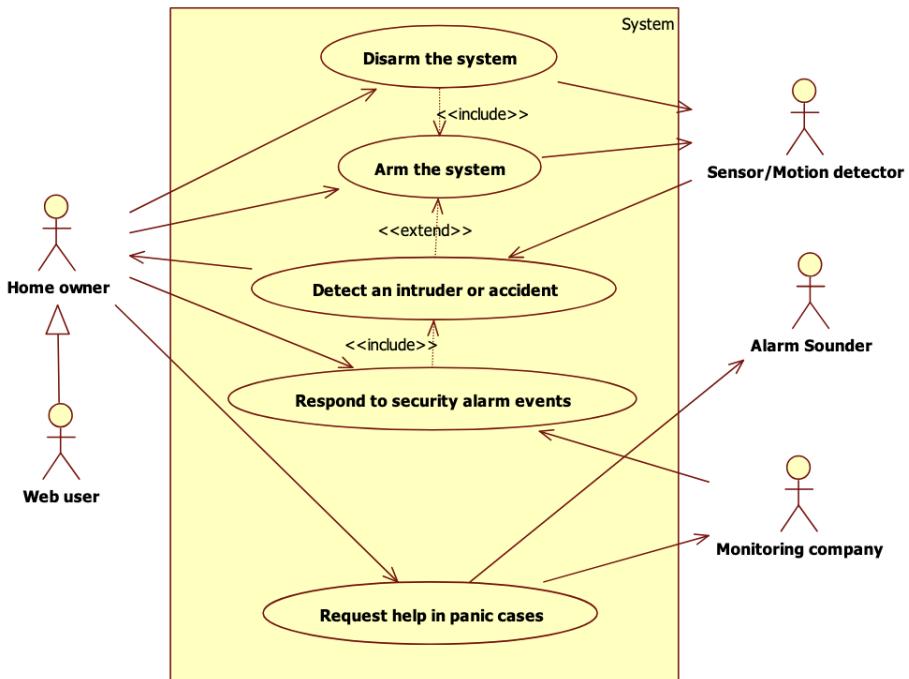
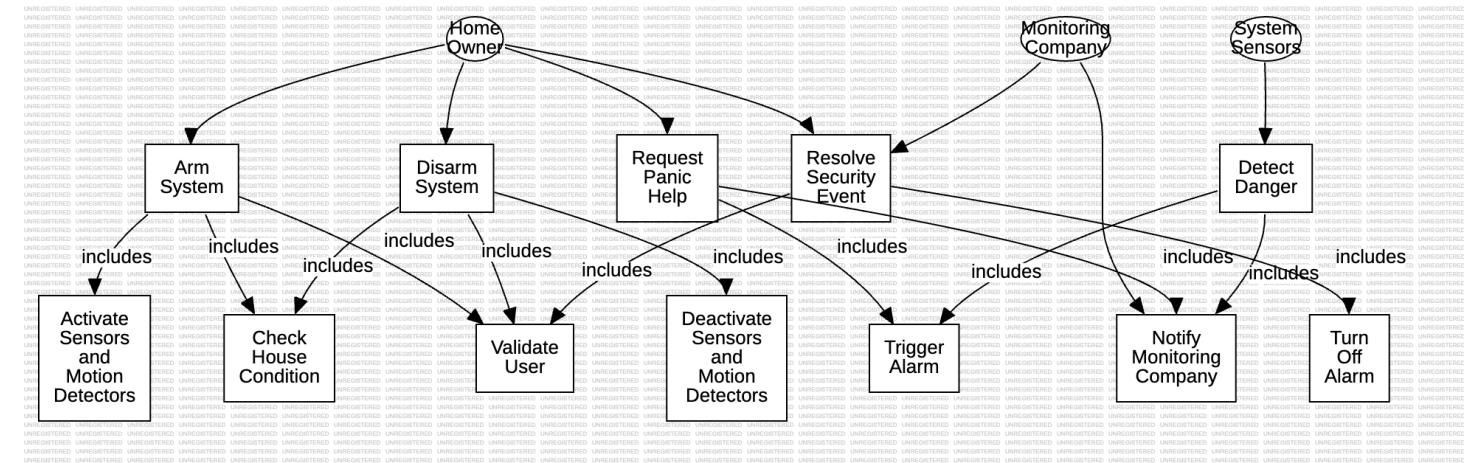


Figure 4 – Use case diagram for “Secure the house” feature

Original Use Case Diagram



Generated Use Case Diagram

SafeHome Product: with detailed description

- Provide following use case description and asks to generate Use-case diagram
- Prompt:
Please draw usecase diagram according to following use case definition.

Table 3 – Stimulus/Response Sequences for “Observe the house” feature

Stimulus:	Home owner requests to view the inside/outside of the house.
Response:	The system queries home owner for choosing the cameras to be displayed from the list of wireless-connected cameras around the house.
Stimulus:	Home owner requests to turn on/off some cameras
Response:	The system queries home owner for choosing the cameras to be turned on or turned off.
Stimulus:	Home owner requests to pan the viewed camera.
Response:	The system pans the camera accordingly corresponding to the requests.
Stimulus:	Home owner requests to zoom in/out the display.
Response:	The system zooms in/out the current display.
Stimulus:	Home owner requests to send an emergency message to the monitoring company when discovering a danger.
Response:	The system informs the monitoring company about the situation with the identities of the camera being viewed.
Stimulus:	Home owner requests to record the current display.
Response:	If the storage is available, system starts to record current display and saves to the web server in the central processor.
Stimulus:	Home owner requests to play back a record.
Response:	System queries the home owner to choose the record to be played.

Result

3.2.3 Use Case Diagram

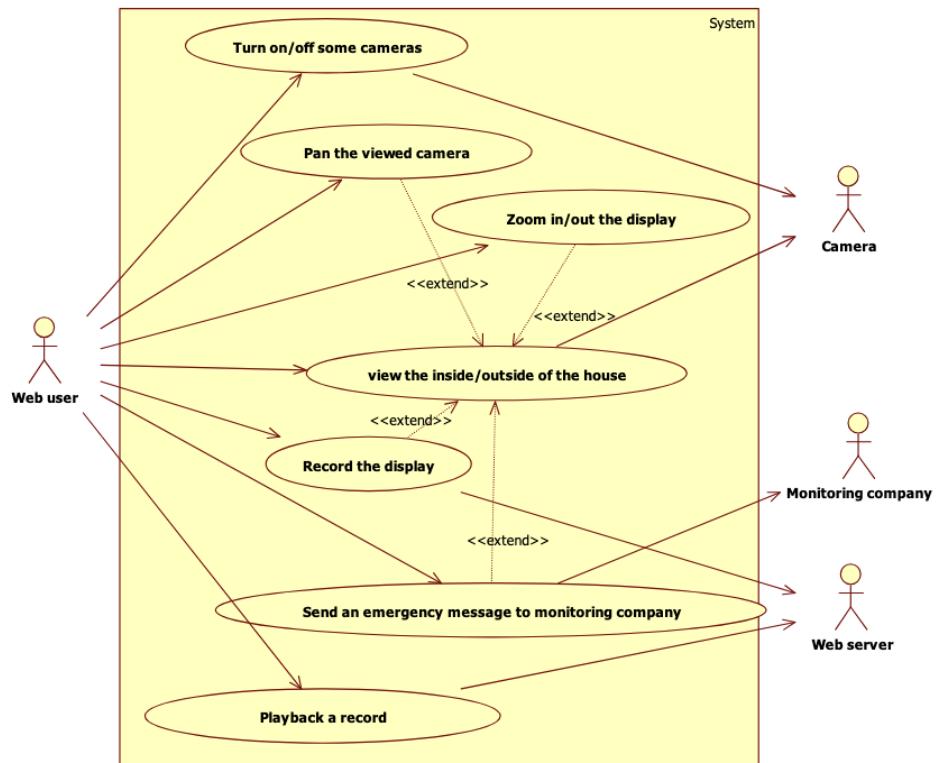
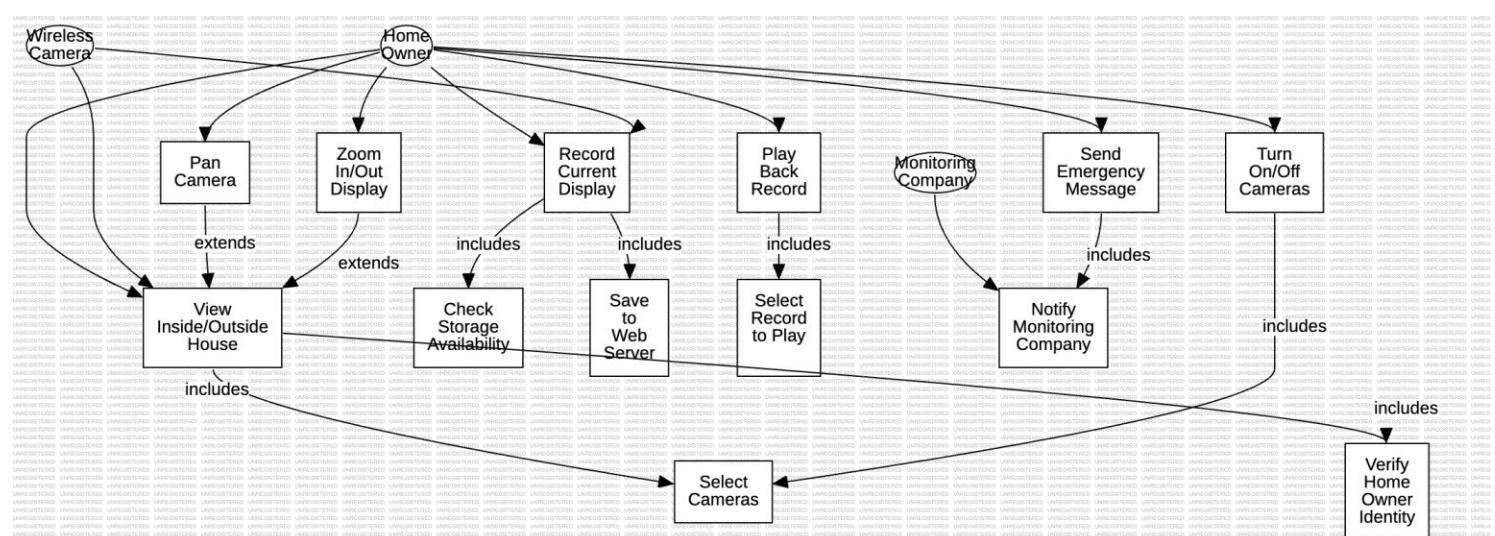


Figure 5 – Use case diagram for “Observe the house” feature

Original Use Case Diagram



Generated Use Case Diagram

SafeHome Product: with detailed description

- Provide following use case description and asks to generate use case diagram
- Prompt:
Please draw use case diagram according to following use case definition.

3.1 Home Security

Description

The SafeHome system is expected to keep the home safe by monitoring a wide variety of sensors and detectors. It shall automatically alert the monitoring personnel when needed, as well as the home occupants.

Use Cases

Use Case ID	UC-1	Use Case Name	Monitor Windows and Doors		
Diagram Ref ID	D-1	Priority	High		
Created By	Francisco Rojas	Last Updated By	Francisco Rojas		
Date Created	3/6/2009	Date Last Updated	3/6/2009		
Goal	To notify the monitoring personnel about a possible intrusion into the home.				
Actors	Primary: Possible Intruder Secondary: Home Owner, Monitoring Personnel				
Assumptions	<ol style="list-style-type: none">1. The home owner has enabled the monitor windows and doors options.2. The home owner enables this during night time or when away with family.				
Constraints	<ol style="list-style-type: none">1. The enablement can only be done if all windows and doors are closed.				
Pre-conditions	<ol style="list-style-type: none">1. The monitor windows and doors options are not set.				
Primary Scenario	<ol style="list-style-type: none">1. The home owner decides to take his entire family out for a considerable amount of time, so he or she closes all the windows and doors.2. The home owner, outside with his family, enables the monitoring of windows and doors remotely using a remote control.3. A door or window opens by a possible intruder as detected by the magnetic switch while the options are enabled, thus alerting SafeHome to send a notification to the monitoring personnel so that they can phone the police. An alarm bell goes off in the home, perhaps scaring the possible intruder.4. The possible intruder runs away.				
Exceptions	<ol style="list-style-type: none">1a. Or the family goes to bed for the night, expecting no visitors.2a. The home owner enables the monitoring of windows and doors using the control panel inside the house then goes to bed.2b. The monitoring option for windows or doors fails to enable because a window or door is not shut, so the home owner checks and shuts the appropriate opening(s) and is finally able to enable the monitoring options.4a. The possible intruder is not an intruder, so he/ she disables the alarm by typing the correct pin and cancels the notification already made to monitoring personnel				

Result

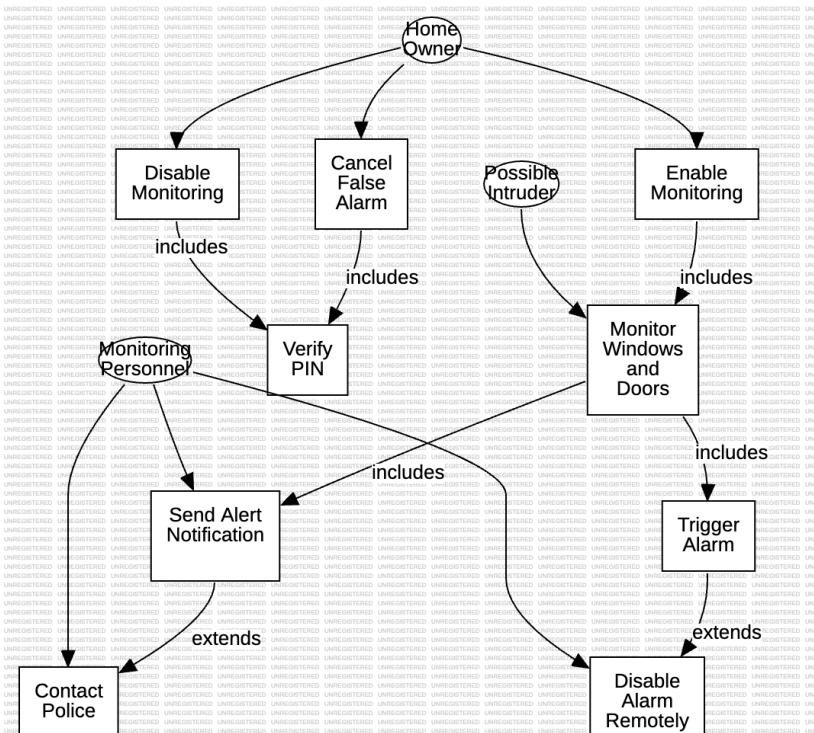
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Generated Use Case Diagram

Using ChatGPT

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- Prompt:
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Result

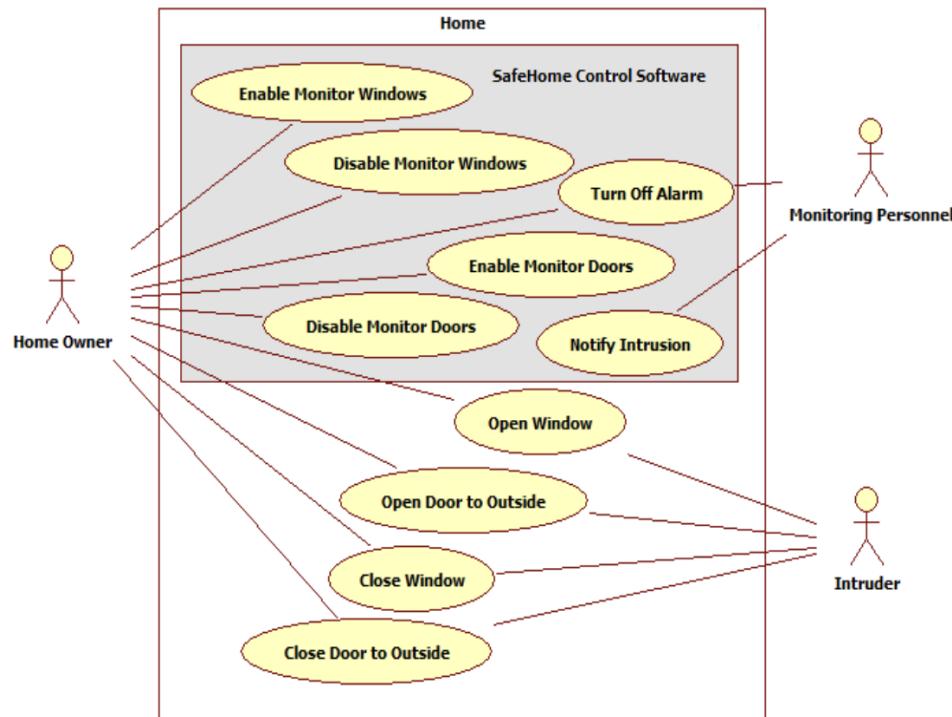
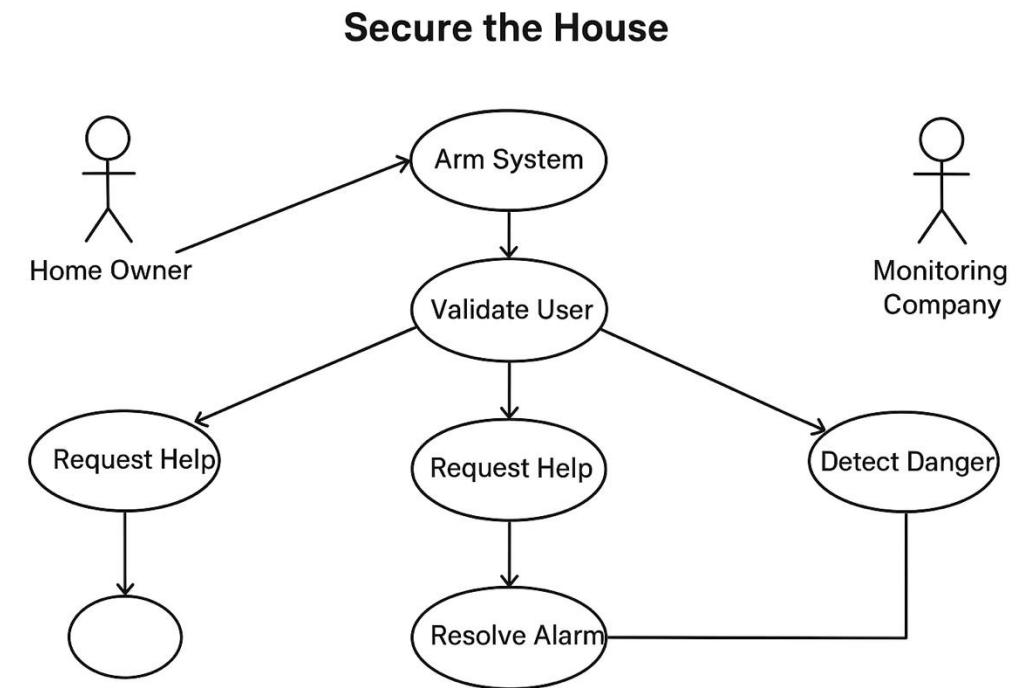


Figure D-1 – Use Case Diagram for Monitoring Windows and Doors

Original Use Case Diagram



Generated Use Case Diagram

Using ChatGPT

- Provide following use case description and asks to generate use case diagram
- Prompt:
Can you draw use case diagram
for following description in
PlantUML

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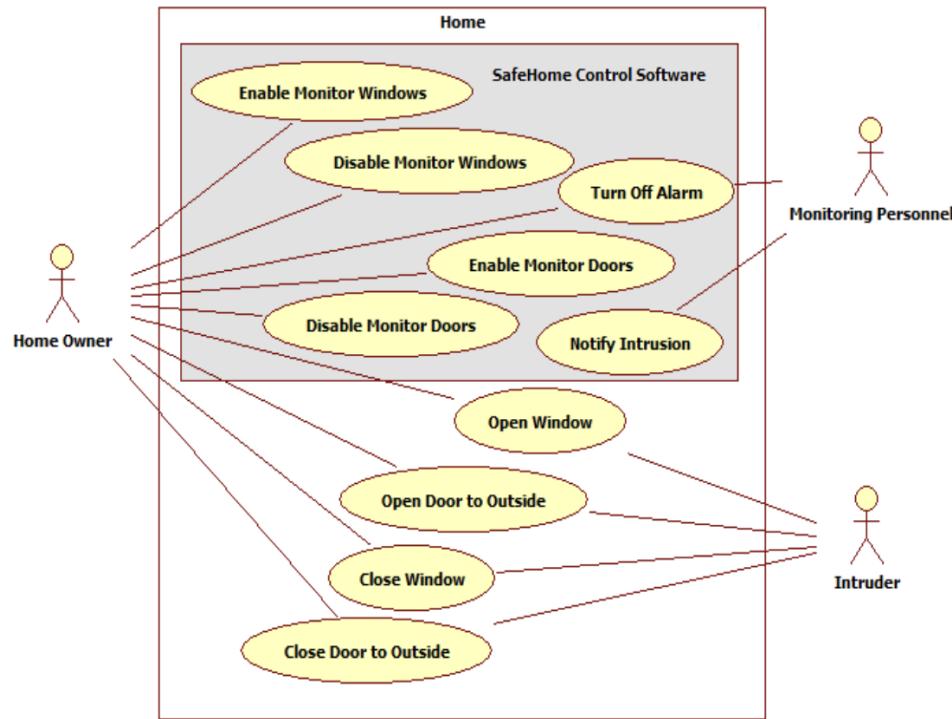
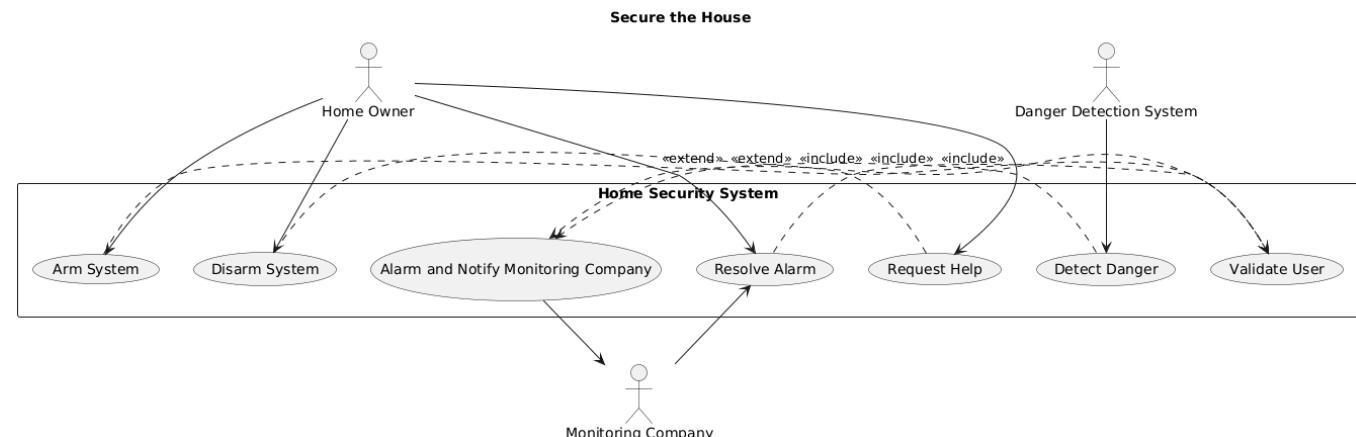


Figure D-1 – Use Case Diagram for Monitoring Windows and Doors

Original Use Case Diagram



Generated Use Case Diagram

Using Gemini-2.5-pro

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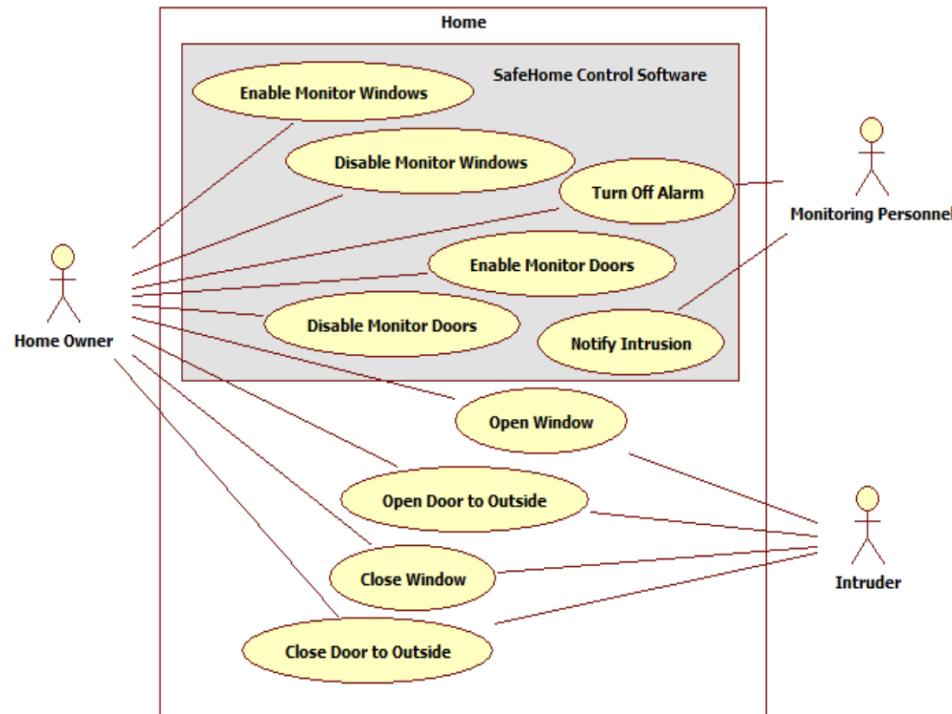
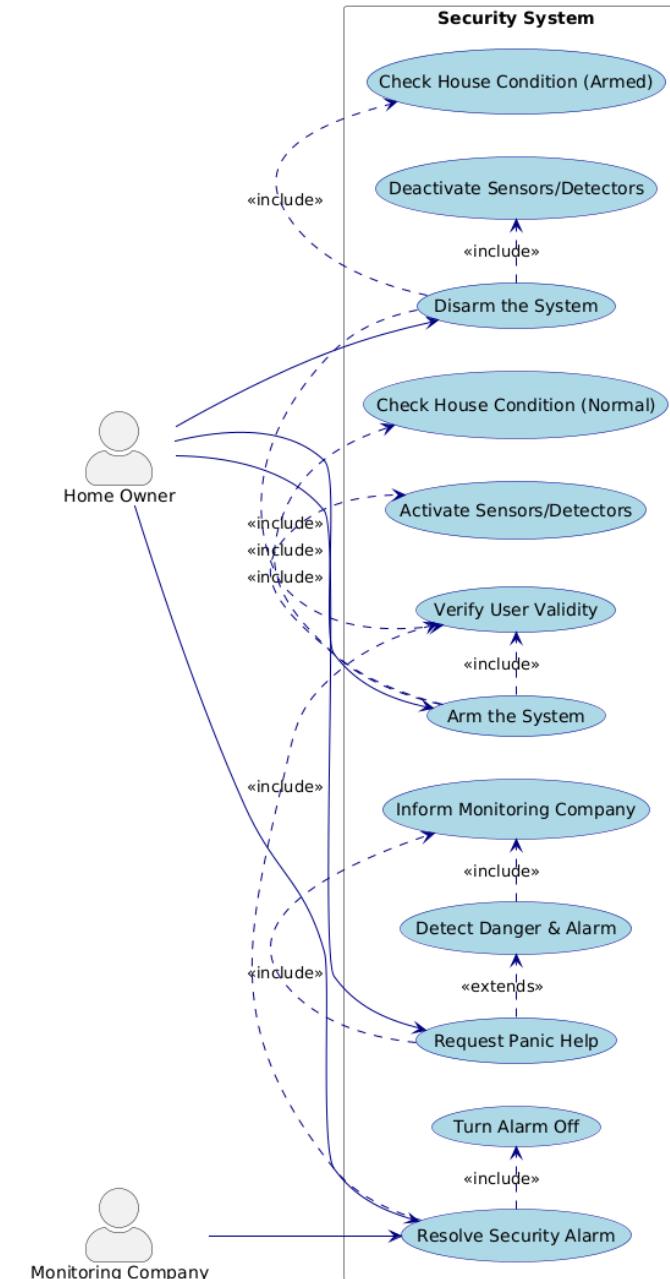


Figure D-1 – Use Case Diagram for Monitoring Windows and Doors

Original Use Case Diagram



Generated Use Case Diagram

Lesson Learned

- **The Goal of UML:** The primary purpose of UML diagrams is to eliminate the ambiguity found in natural language descriptions, providing a clear and standardized visual model.

Lesson Learned

- Paradoxically, UML diagrams generated by Large Language Models can sometimes introduce *more* ambiguity, rather than reducing it, due to potential misinterpretations of the source text.
- When using LLMs to generate UML diagrams, we must critically review and refine the output to ensure it clarifies the system's design.