

Summary-Level Use Cases

Use Case: UseSmartFireSystem

Scope: SmartFireSystem

Level: SUMMARY

Intention: "The user intends to use the Smart Fire System."

Multiplicity: "Many users can use the Smart Fire System at the same time."

Primary Actor: HUMAN::User::1..*

Main Success Scenario:

"The User logs into the System."

[ConfigureAlarmSettings] "The User configures the alarm settings."

[MonitorFire] "The System monitors for fire."

[HandleFireDetection] "The System handles fire detection."

"The User logs out of the System."

Use case ends in: SUCCESS

Extensions:

Alternative for 1:

1a. "The User provides the wrong credentials to the System."

1a.1. "The System provides a message to the User."

Use case ends in: FAILURE

Exception for (1-5):

(1-5)a.^ timeout:60s "WiFi fails to send confirmation."

(1-5)a.1. {NETWORK_EXCEPTION::WiFiUnreachable} "WiFi unreachable."

Use case ends in: FAILURE

User Goal-Level Use Cases

Use Case: ConfigureAlarmSettings

Scope: SmartFireSystem

Level: USER_GOAL

Intention: "The user configures the alarm settings."

Multiplicity: "Many users can configure the alarm settings at the same time."

Primary Actor: HUMAN::User::1..*

Main Success Scenario:

"The User accesses the settings menu."

"The User adjusts the alarm settings."

"The System saves the new settings."

Use case ends in: SUCCESS

Extensions:

Exception for 3:

3a. {SOFTWARE_EXCEPTION::SettingsSaveError} "Error saving settings."

Use case ends in: FAILURE

Use Case: MonitorFire

Scope: SmartFireSystem

Level: USER_GOAL

Intention: "The system monitors for fire."

Multiplicity: "The system continuously monitors for fire."

Primary Actor: None

Main Success Scenario:

"The System activates smoke and heat sensors."

"The System activates carbon monoxide sensors."

"The System continuously monitors sensor data."

Use case ends in: SUCCESS

Extensions:

Exception for 1:

1a. {HARDWARE_EXCEPTION::SensorFailure} "Sensor failure detected."

Use case ends in: FAILURE

Exception for 3:

3a. {NETWORK_EXCEPTION::DataTransmissionError} "Error in data transmission."

Use case ends in: FAILURE

Use Case: HandleFireDetection

Scope: SmartFireSystem

Level: USER_GOAL

Intention: "The system handles fire detection."

Multiplicity: "The system handles multiple fire detections simultaneously."

Primary Actor: None

Secondary Actor:

SOFTWARE::FireDepartmentSystem::...

SOFTWARE::UserApp::... (never used this actor in this use case)

ACTUATOR::SprinklerSystem::1..10

Main Success Scenario:

"The System detects fire through sensors."

"The System sounds the alarm."

"The System sends an alert to the User via the external app."

"The System notifies the local fire department."

"The System activates the sprinkler system."

Use case ends in: SUCCESS

Extensions:

Exception for 4:

4a. {NETWORK_EXCEPTION::FireDepartmentUnreachable} "Cannot contact fire department."

4a.1. "The System notifies the User of the failure."

Use case ends in: FAILURE

Exception for 5:

5a. {HARDWARE_EXCEPTION::SprinklerFailure} "Sprinkler system failure."

Use case ends in: FAILURE

Sub-Function-Level Use Cases

Use Case: SoundAlarm

Scope: SmartFireSystem

Level: SUB_FUNCTION

Intention: "The system sounds the alarm."

Multiplicity: "The system can sound multiple alarms simultaneously."

Primary Actor: None

Main Success Scenario:

"The System activates the alarm."

Use case ends in: SUCCESS

Use Case: NotifyUser

Scope: SmartFireSystem

Level: SUB_FUNCTION

Intention: "The system notifies the user."

Multiplicity: "The system can notify multiple users simultaneously."

Primary Actor: None

Main Success Scenario:

"The System sends a notification to the User via the external app."

Use case ends in: SUCCESS

Use Case: NotifyFireDepartment

Scope: SmartFireSystem

Level: SUB_FUNCTION

Intention: "The system notifies the fire department."

Multiplicity: "The system can notify multiple fire departments simultaneously."

Primary Actor: None

Main Success Scenario:

"The System sends a notification to the local fire department."

Use case ends in: SUCCESS

Handler Use Cases

Handler Use Case: ReconnectWiFi

Scope: SmartFireSystem

Level: SUMMARY

Intention: "To reconnect to the WiFi when the WiFi is unreachable."

Primary Actor: None

Contexts and Exceptions: UseSmartFireSystem

{NETWORK_EXCEPTION::WiFiUnreachable}

Main Success Scenario:

"Step 1 can be repeated as many times as necessary."

"The system attempts to reconnect to WiFi."

"The system connects to the WiFi."

Use case ends in: SUCCESS

Extensions:

Alternative for 1:

1a. {timeout:30s} "The system is unable to connect to WiFi."

Use case continues at step: 1

Handler Use Case: HandleSensorFailure

Scope: SmartFireSystem

Level: USER_GOAL

Intention: "To handle sensor failure."

Primary Actor: None

Contexts and Exceptions: MonitorFire {HARDWARE_EXCEPTION::SensorFailure}

Main Success Scenario:

"The System notifies the User of the sensor failure."

"The System attempts to reset the sensor."

"The System resumes monitoring."

Use case ends in: SUCCESS

Extensions:

Alternative for 2:

2a. {timeout:30s} "The system is unable to reset the sensor."

Use case ends in: FAILURE

Handler Use Case: HandleFireDepartmentUnreachable

Scope: SmartFireSystem

Level: USER_GOAL

Intention: "To handle the situation when the fire department is unreachable."

Primary Actor: None

Contexts and Exceptions: HandleFireDetection

{NETWORK_EXCEPTION::FireDepartmentUnreachable}

Main Success Scenario:

"The System notifies the User of the failure."

"The System attempts to contact the emergency contact."

Use case ends in: SUCCESS

Extensions:

Alternative for 2:

2a. {timeout:30s} "The system is unable to contact the emergency contact."

Use case ends in: FAILURE