Original Table of contents (modified by JP)

0. INTRODUCTION

The following document represents the first iteration for an alarm system. The system will be set up in the home of a user and will provide protection against fires and intrusion. This document contains the requirements, use cases, use case maps, and interaction diagrams for the system and takes into account four basic scenarios: away arming, disarming, fire alarm, and intrusion alarm. The purpose of this text is to understand the scenarios, interactions and objects that are required and the messages that must be sent in order for the four scenarios mentioned above to be carried out.

The requirements have been divided into three sections: functional requirements, non-functional requirements and interface requirements. Each requirement has been uniquely identified by a code (FR-F# for functional requirements, FR-I# for interface requirements and NFR# for non-functional requirements). Functional requirements are the task or jobs that are necessary for the functioning of the system (e.g. sensors detecting intrusion) and non-functional requirements are thought to be the requirements that are not directly part of the function of the system (e.g. exit delays). Interface requirements are necessary messages that must be sent to the user through the system interface.

The alarm will be created for the need of the user, and thus the user is the main actor in many of the scenarios. The user will be responsible for entering access codes and for working the interface of the alarm panel, while the system will be responsible for monitoring sensors, reporting events to the user, keeping track of the system state, and sounding alarms. The scenario textual descriptions take these requirements into account and have been created to provide a basic description of the four scenarios that are being covered in this iteration, without going into heavy detail about the internal workings of the system. Alternative scenarios have been provided for cases in which the expected sequence has not been fully completed. Five STDs have been included: away arming, intrusion alarm/disarming, system validates user, fire alarm, and intrusion sensor triggered in ready state. All STDs have been cross-listed to previous requirements and uniquely identified by a number.

For each STD, a corresponding use case map and interaction diagram has been created. The use case maps include a related path set for a list of responsibilities corresponding to each sequence of the STDs. Bounded use case maps have been used in this iteration in order to show the objects involved in each scenario. A list of responsibilities has been included with the UCMs and the RPS's of each UCM make use of this list in order to map out the responsibilities required for each of the scenarios described earlier. Interation diagrams have also been created to provide a nice outline of the messages that must be sent between the objects involved for each scenario. The MSC '96 syntax has been used for the interaction diagrams. Each MSC has been identified by a unique number (MSC-#). A responsibility cross-reference table has also been included in the document in order to link messages in the MSCs with responsibilities from the UCMs for each of the scenarios.

Also included is a structural diagram. The structural diagram provides a exterior view of the objects of the system and how they interact together to create the entire system as a whole. In the original plan, a problem manager was going to be included in order to detect trouble conditions through a sensor controller. After further review, the problem manager was left out leaving the sensor controller in tact with what appears to be a redundant responsibility within the system. The sensor controller will become more important in later iterations.

The internal monitoring system which will be used in later iterations in order to contact local authorities and keep track (internally) of what is happening to the system will not be analyzed until later iterations. Other more detailed controls such as bypass zones, changing access codes and detailed trouble zone descriptions will also be explored in later iterations. The notions of robustness and random user errors have not been taken into account in the use cases provided here, strictly only the basic and most commonly used functions of the systems have been looked at. It has also been assumed that an LED keypad will be used for this iteration.

The main purpose of this document is to create a sound and traceable design for the system. The requirements, STDs, UCMs and MSCs included below should provide a sound and efficient design for the basic functions of the alarm system.

1. REQUIREMENTS

1.1 FUNCTIONAL REQUIREMENTS

ID	REQUIREMENTS	3 REFERENCE
FR-F 1	The system is able to detect intrusions / no intrusions	{paragraph 2 , page 7}
FR-F 2	The system is able to activate / deactivate continuous siren to indicate intrusions	{paragraph 2 , page 7}
FR-F 3	**The system is able to detect smoke / fire**	{paragraph 2 , page 1}
FR-F 4	The system is able to activate / deactivate pulsing siren to indicate smoke / fire	{paragraph 1 , page 7}
FR-F 5	**The user is able to arm the system using an access code**	{paragraph 4 , page 4}
FR-F 6	**The user is able to disarm the system using an access code**	{paragraph 1 , page 6}
FR-F 7	**The system is able to perform self diagnoses**	{designer's assumption}
FR-F 8	The system is able to detect opening / closing of entry / exit door	{paragraph 4 , page 4} , {paragraph 1 , page 6}
FR-F 9	The system resets the smoke detectors	{paragraph 7 , page 14}

1.2 INTERFACE REQUIREMENTS

ID	REQUIREMENTS	REFERENCE
FR-I 1 FR-I 1.1 FR-I 1.2 FR-I 1.3 FR-I 1.4 FR-I 1.5	The interface is able to show system status: ***The system is in armed mode*** The system is in fire alarm mode The system is in ready mode The system is in alarm memory mode The system is in intrusion alarm mode	{paragraph 6 , page 1}
FR-I 2 FR-I 2.1 FR-I 2.2 FR-I 2.3	The system has audible devices to inform user of: Fire (pulsing siren) Intrusions (continuous siren) Entries onto keypad (beeps)	 {paragraph 5 , page 14} {paragraph 2 , page 7} {paragraph 3 , page 4}

FR-I 2.4	Entry / exit delay (beeps)	{paragraph 4 , page 4}
FR-I 3	The interface has command entry keys (keypad) and can read the keys when pressed (user input)	{paragraph 6 , page 1}
FR-I 4 FR-I 4.1 FR-I 4.2	The interface is able to indicate that: An invalid access code was entered Previous alarms occurred	 {paragraph 3 , page 4} {paragraph 3 , page 6}

1.3 NON-FUNCTIONAL REQUIREMENTS

ID	REQUIREMENTS	REFERENCE
NFR 1	Entry / exit delay time limits are known by user	{paragraph 7 , page 4}
NFR 2	Entry / exit delay expires after one minute	{paragraph 7 , page 1}
NFR 3	The system has keypads close to the entry / exit door	{paragraph 6, page 1}
NFR 4	The system is armed by only one person at a time	{designer's assumption}
NFR 5	The system handles only one access code at a time	{designer's assumption}
NFR 6	If the user does not exit previous alarms, the system goes in ready mode after 30 seconds	{paragraph 5 , page 14}
NFR 7	If smoke is detected within 90 seconds of the user silencing the smoke detectors, fire alarm resounds	{paragraph6 , page 14}

CATEGORY	4 IDENTIFIER
Assumptions	A
Functional Requirements	FR-F
Interface Requirements	FR-I
Non-Functional Requirements	NFR
Scenario Textual Descriptions	STD
Responsibilities	Resp
Unbound Use Case Maps	U-UCM
Object Specifications	O
Bound Use Case Map	B-UCM
Message Sequence Charts	MSC

2. ASSUMPTIONS

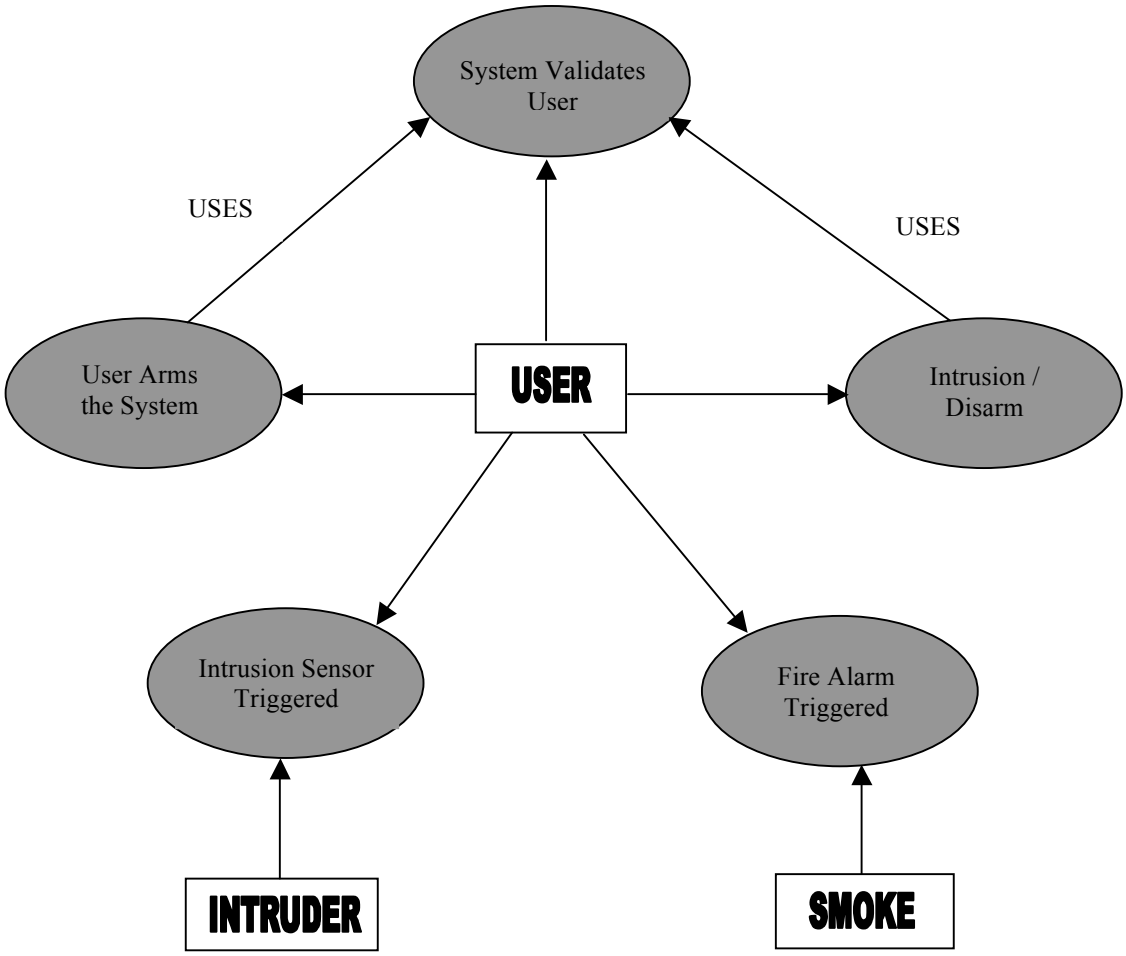
ID	DESCRIPTION OF ASSUMPTIONS
A1	The system's interface consists of one LED keypad with a group of zones and system status lights.
A2	The system has audible devices to alert user of fire or intrusion (sirens).
A3	The installation is complete and well installed for each zone.
A4	The system is armed with no bypassing of zones.
A5	All security codes are programmed properly.
A7	The connection to the monitoring system is taken care of (no implementation for this iteration).
A8	The system's fire alarm is already set and activated (all fire sensors are activated).
A9	The system has functional batteries and an adequate number of sensors.
A10	The system has no trouble conditions (low battery, broken sensors).
A11	The system only has only access code.
A12	The system starts up with all sensors closed and the system is in ready state.
A13	Fire siren takes precedence over the intrusion siren.
A14	The system can not be disarmed in exit delay mode.

3. SCENARIO TEXTUAL DESCRIPTIONS

3.1 STD TITLES

ID	STD TITLES
STD1	User Arms the System
STD2	System Validates User
STD3	Intrusion Sensor Triggered in Ready Mode
STD4	Intrusion Alarm / User disarms the system
STD5	Fire Alarm Triggered and Reset

3.2 USE CASE DIAGRAM



3.3 STDS

3.3.1 STD1: User Arms the System

STD1: User Arms the System	Requirements
Description: This scenario describes how the system is armed in away arming mode.	
Actors: User	
Pre-condition: System is in ready mode (system secure).	
Triggering Event: User enters the access code (STD 2).	
Sequence: 1. Exit delay begins. 2. Interface indicates that the system is in exit delay mode. 3. User exits the building through the assigned exit door. 4. Eventually, the exit delay expires. 5. System goes in armed mode. 6. Interface indicates the system is armed.	 NFR 1 FR-I 2.4 FR-F 8 NFR 2 FR-F 1, FR-F 5 FR-I 1.1
Post-condition: System is in armed mode.	
Resulting Events: Interface indicates the system is armed.	
Alternative scenarios: 3.1 User does not exit the building, the system arms in stay mode (not implemented in this iteration). 3.2 User exits the building but leaves the exit door open (exit fault). Keypad beeps and alarm sounds until the user disarms the system (STD 4). 4.1 A sensor is tripped before the exit delay expires. Intrusion alarm starts (STD 4).	 FR-F 7, FR-F 8 FR-F 2, FR-F 8 FR-I 2.2 FR-F 1
Nonfunctional requirements: - The exit delay time limit is known by user - The exit delay expires after one minute. - The system is armed by only one person at a time.	 NFR 1 NFR 2 NFR 4

3.3.2 STD2: System Validates User

STD2: System Validates User	Requirements
Description: This scenario describes how the system validates the access code.	
Actors: User	
Pre-condition: System is in ready mode or in armed mode.	
Triggering Event: User enters the access code.	
Sequence: 1 System retrieves user input. 2 System checks the entered access code.	 FR-I 3 FR-F 5, FR-F 6

Post-condition: System returns to the mode it was previously in.	
Resulting Events: none	
Alternative scenarios: 2.1 If the code is not valid, the system indicates a keypad entry error and waits for the user to press the reset key (# key).	FR-I 4.1
Nonfunctional requirements: - The system handles only one access code at a time.	NFR 5

3.3.3 STD3: Intrusion Sensor Triggered in Ready Mode

STD3: Intrusion Sensor Triggered in Ready Mode	Requirements
Description: This scenario describes how the system responds to a sensor triggered while the system is not armed.	
Actors: User	
Pre-condition: At least one sensor is secure.	
Triggering Event: A sensor is left insecure (open door or window).	
Sequence: 1. System becomes insecure. 2. Interface indicates the system is ready light goes off 3. Interface displays all insecure sensors/zone. 4. Eventually, the user fixes or closes the open sensor. 5. System detects all sensors secure. 6. System goes in ready mode (system secure). 7. Interface indicates the system is ready (ready light goes on).	 FR-F 1 FR-I 1.3 FR-I 4.2 FR-F 7 FR-F 7 FR-F 1 FR-I 1.3
Post-condition: System is in ready mode.	
Resulting Events: Interface indicates the system is ready.	
Alternative scenarios: 5.1 System detects at least one open sensor. Continue with step 3.	 FR-F 1
Nonfunctional requirements: none	
Comments: - No bypassing of zones is implemented in this iteration, so that if the insecure sensors are not fixed, the system cannot be armed.	

3.3.4 STD4: Intrusion Alarm / User Disarms the System

STD4: User Disarms the System	Requirements
Description: This scenario describes how the system is disarmed.	
Actors: User, intruder	
Pre-condition: System is in armed mode.	
Triggering Event: Intrusion sensor is triggered.	
Sequence: 1. System goes in intrusion alarm mode. 2. System sounds continuous siren. 3. Interface indicates the system is in intrusion alarm mode. 4. Eventually, the system validates the user (STD 2). 5. System stops the siren. 6. Interface indicates previous alarms (if any). 7. User optionally views previous alarms. 8. Interface goes in alarm memory mode. 9. User optionally exits viewing previous alarms. 10. System goes in ready mode (system secure). 11. Interface indicates the system is in ready mode.	**5 FR-F 1** FR-F 2, FR-I 2.2 FR-I 1.5 FR-I 3, FR-F 6 FR-F 2 FR-I 4.2 FR-I 3 FR-I 1.4 FR-I 3 FR-F 1 FR-I 1.3
Post-condition: System is in ready mode.	
Resulting Events: Interface indicates the system is ready.	
Alternative scenarios: 1.1.1 User enters through the entry door. Entry delay begins. 1.1.2 User optionally enters the access code and is validated (STD2). 1.1.3 Entry delay stops. Continue with step 9. 1.2.1 Entry delay expires before the user enters the access code. 1.2.2 System goes in intrusion alarm mode. Continue with step 2. 7.1.1 User does not view previous alarms. Continue with step 10. 7.1.2 User does not exit viewing previous alarms. Continue with step 10.	NFR 1, FR-I 2.4 FR-I 3, FR-F 6 NFR 1, NFR 2 **6 FR-I 3** FR-I 3
Nonfunctional requirements: - Entry delay expires after one minute. - If the user does not exit previous alarms, the system goes in ready mode after 30 seconds.	NFR 2 NFR 6

3.3.5 STD5: Fire Alarm Triggered and Reset

STD5: Fire Alarm Triggered and Reset	Requirements
Description: This scenario describes how the system reacts to a fire alarm and how the user may cancel the alarm.	
Actors: User, smoke	
Pre-condition: none	
Triggering Event: Smoke detectors detect smoke.	
Sequence: 1. System goes in fire alarm mode. 2. System sounds pulsing siren. 3. Interface indicates the system is in fire alarm mode. 4. User optionally presses a key to silence the siren. 5. User eventually resets the smoke detectors. 6. System resets smoke detectors. 7. System goes in ready mode. 8. Interface indicates the system is in ready mode.	 FR-F 3 FR-F 4, FR-I 2.1 FR-I 1.2 FR-I 3 FR-I 3 FR-F 9 FR-F 1 FR-I 1.3
Post-condition: System is in ready mode.	
Resulting Events: Interface indicates the system is ready.	
Alternative scenarios: 5.1 User does not reset the smoke detectors. Continue with step 2. 6.1 Smoke is detected after resetting the smoke detectors. Continue with step 1.	 FR-I 3 FR-F 3
Nonfunctional requirements: - If smoke is detected within 90 seconds of the user resetting the smoke detectors, fire alarm resounds.	 NFR 7

4. USE CASE MAPS

4.1 RESPONSIBILITIES

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4.1.1 System Responsibilities

ID	RESPONSIBILITIES	*STDS*
Resp1	**System's intrusion sensors detects intrusion**	(STD1,4.1) , (STD3,5.1)
Resp2	System recognizes secure sensors	(STD1,3) , (STD3,4) , (STD3,5)
Resp3	System recognizes insecure sensors	(STD1,3.2) , (STD1,4.1), (STD3,5.1)
Resp4	System recognizes all sensors secure	(STD3,5)
Resp5	System differentiates the entry/exit sensor from other sensors	(STD1,3) , (STD1,3.1) , (STD1,3.2) , (STD4,1.1.1)
Resp6	System resets fire sensors	(STD5,5) , STD(5,6) , (STD5,5.1)
Resp7	System's fire sensors detects smoke	(STD5,6.1)
Resp8	System starts intrusion siren	(STD4,2) , (STD1,3.2)
Resp9	System stops intrusion siren	(STD4,5)
Resp10	System starts fire siren	(STD5,2)
Resp11	System stops fire siren	(STD5,4)
Resp12	System arms intrusion sensors	(STD1,5)
Resp13	System disarms intrusion sensors	(STD4,4)
Resp14	System verifies user input	(STD2,2) , (STD2,2.1) , (STD4,4) , (STD4,7) , (STD4,9) , (STD4,1.1.2), (STD5,4) , (STD5,5)
Resp15	System starts entry delay timer	(STD4,1.1.1)
Resp16	System stops entry delay timer	(STD4,1.1.3)
Resp17	System starts exit delay timer	(STD1,1)
Resp18	System stops exit delay timer	(STD1,3)

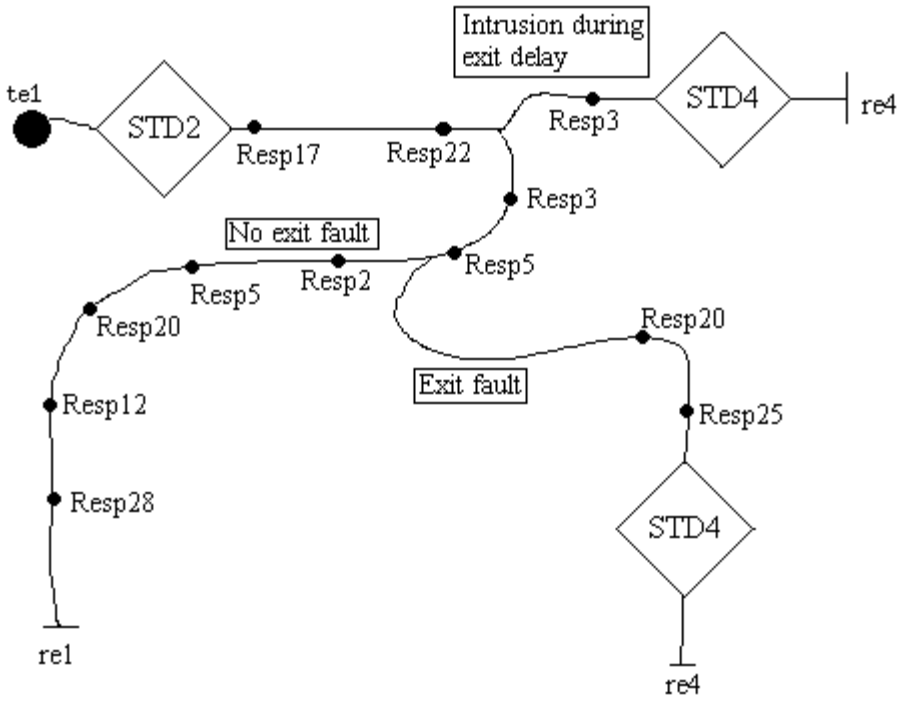
Resp19	System detects entry delay expired	(STD4,1.2.1)
Resp20	System detects exit delay expired	(STD1,4)

4.1.2 Interface Responsibilities

8 ID	RESPONSIBILITIES	STDS
Resp21	Interface indicates the system is in entry delay	(STD4.1.1)
Resp22	Interface indicates the system is in exit delay	(STD1,2)
Resp23	Interface retrieves user input	(STD2,2) , (STD2,2.1) , (STD4,4) , (STD4,7) , (STD4,9) , (STD4,1.1.2), (STD5,4) , (STD5,5)
Resp24	Interface indicates incorrect access code entered	(STD2,2.1)
Resp25	Interface indicates exit error (exit fault)	(STD1,3.2)
Resp26	Interface indicates the system is ready	(STD3,7) , (STD4,11) , (STD5,7)
Resp27	Interface indicates the system is not ready	(STD3,2)
Resp28	Interface indicates the system is armed	(STD1,6)
Resp29	Interface indicates the system is in fire alarm mode	(STD5,3)
Resp30	Interface indicates the system is in intrusion alarm mode	(STD4,3)
Resp31	Interface indicates zones with insecure sensor(s)	(STD3,3)
Resp32	Interface indicates previous alarms	(STD4,6)
Resp33	Interface displays the list of zones in which previous alarms occurred	(STD4,8)

4.2 UNBOUND UCMS

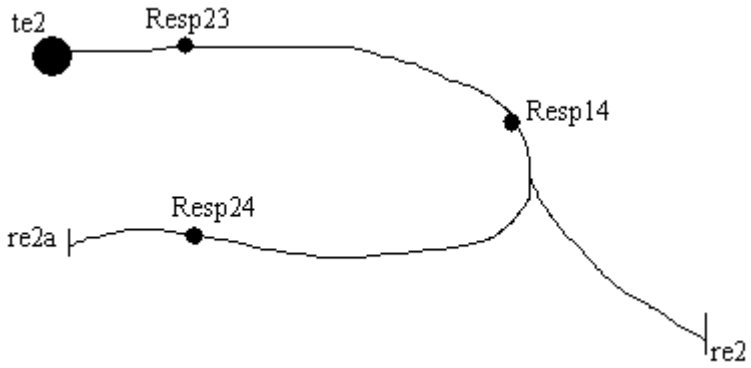
4.2.1 U-UCM1: User Arms the System



te1	*User enters the access code (STD 2).*
re1	*Interface indicates the system is armed.*
re4	*Interface indicates the system is ready.*

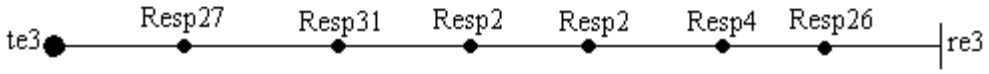
RespID	**RESPONSIBILITIES**	***STD STEPS***
Resp2	System recognizes secure sensors	(STD1,3)
Resp3	System recognizes insecure sensors	(STD1,3.2) , (STD1,4.1)
Resp5	System differentiates the entry/exit sensor from other sensors	(STD1,3) , (STD1,3.1) , (STD1,3.2)
Resp12	System arms intrusion sensors	(STD1,5)
Resp17	System starts exit delay timer	(STD1,1)
Resp20	System detects exit delay expired	(STD1,4)
Resp22	Interface indicates the system is in exit delay	(STD1,2)
Resp25	Interface indicates exit error (exit fault)	(STD1,3.2)
Resp28	Interface indicates the system is armed	(STD1,6)

4.2.2 U-UCM2: System Validates User



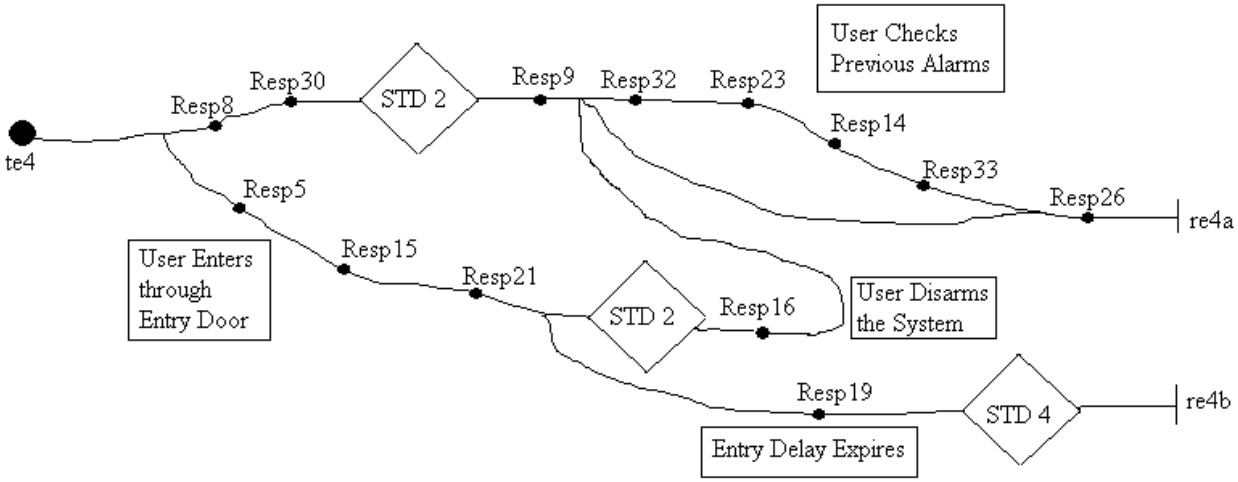
te2	*User enters the access code.*	
re2	*none*	
re2a	*Interface indicates invalid entry.*	
RespID	**RESPONSIBILITIES**	***STD STEPS***
Resp14	System verifies user input	(STD2,2) , (STD2,2.1)
Resp23	Interface retrieves user input	(STD2,2) , (STD2,2.1)
Resp24	Interface indicates incorrect access code entered	(STD2,2.1)

4.2.3 U-UCM3: Intrusion Sensor Triggered in Ready Mode



te3	*A sensor is left insecure (open door or window).*	
re3	*Interface indicates the system is ready.*	
RespID	**RESPONSIBILITIES**	***STD STEPS***
Resp2	System recognizes secure sensors	(STD3,4) , (STD3,5)
Resp3	System recognizes insecure sensors	(STD3,5.1)
Resp4	System recognizes all sensors secure	(STD3,5)
Resp26	Interface indicates the system is ready	(STD3,7)
Resp27	Interface indicates the system is not ready	(STD3,2)
Resp31	Interface indicates zones with insecure sensor(s)	(STD3,3)

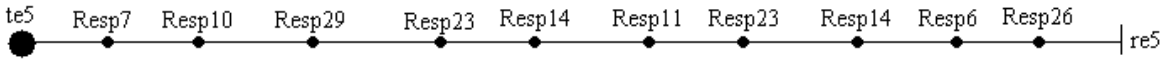
4.2.4 U-UCM4: Intrusion Alarm / User Disarms the System



te4	*Intrusion sensor is triggered.*
re4a	*Interface indicates the system is ready.*
re4b	*Intrusion sensor is triggered.*

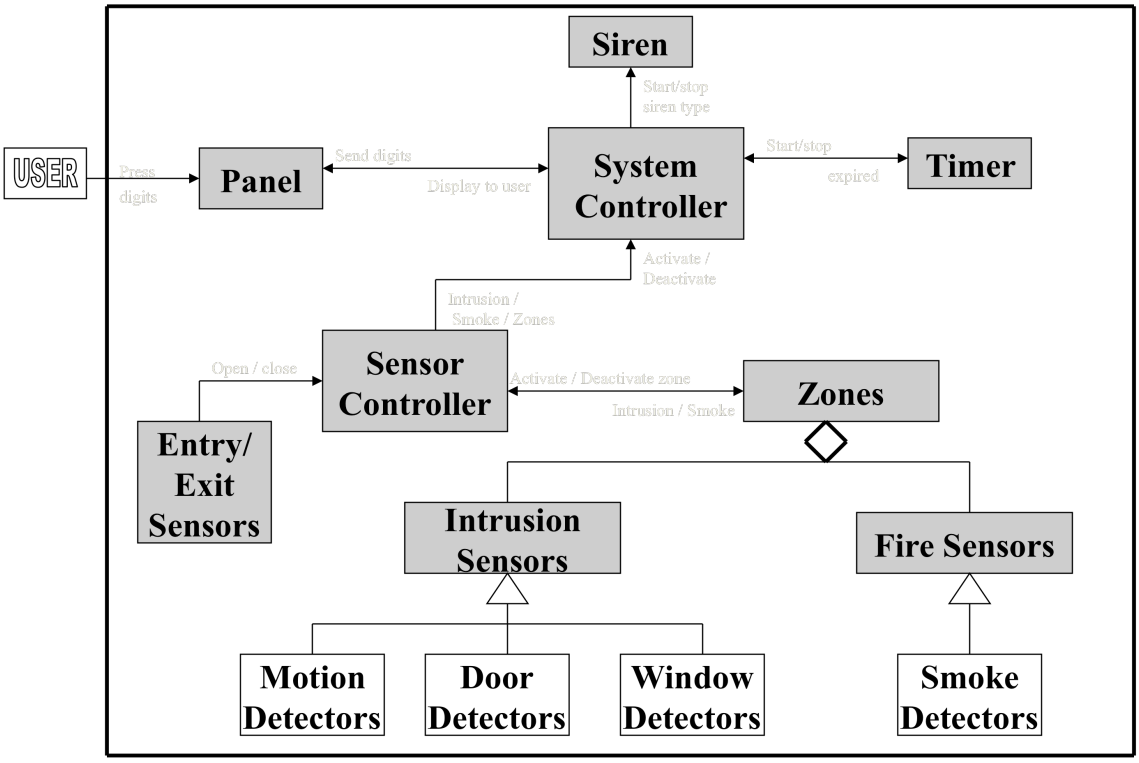
RespID	**RESPONSIBILITIES**	***STD STEPS***
Resp5	System differentiates the entry/exit sensor from other sensors	(STD4,1.1.1)
Resp8	System starts intrusion siren	(STD4,2)
Resp9	System stops intrusion siren	(STD4,5)
Resp14	System verifies user input	(STD4,4) , (STD4,7) , (STD4,9) , (STD4,1.1.2)
Resp15	System starts entry delay timer	(STD4,1.1.1)
Resp16	System stops entry delay timer	(STD4,1.1.3)
Resp19	System detects entry delay expired	(STD4,1.2.1)
Resp21	Interface indicates the system is in entry delay	(STD4.1.1)
Resp23	Interface retrieves user input	(STD4,4) , (STD4,7) , (STD4,9) , (STD4,1.1.2)
Resp26	Interface indicates the system is ready	(STD4,11)
Resp30	Interface indicates the system is in intrusion alarm mode	(STD4,3)
Resp32	Interface indicates previous alarms	(STD4,6)
Resp33	Interface displays the list of zones in which previous alarms occurred	(STD4,8)

4.2.5 U-UCM5: Fire Alarm Triggered and Reset



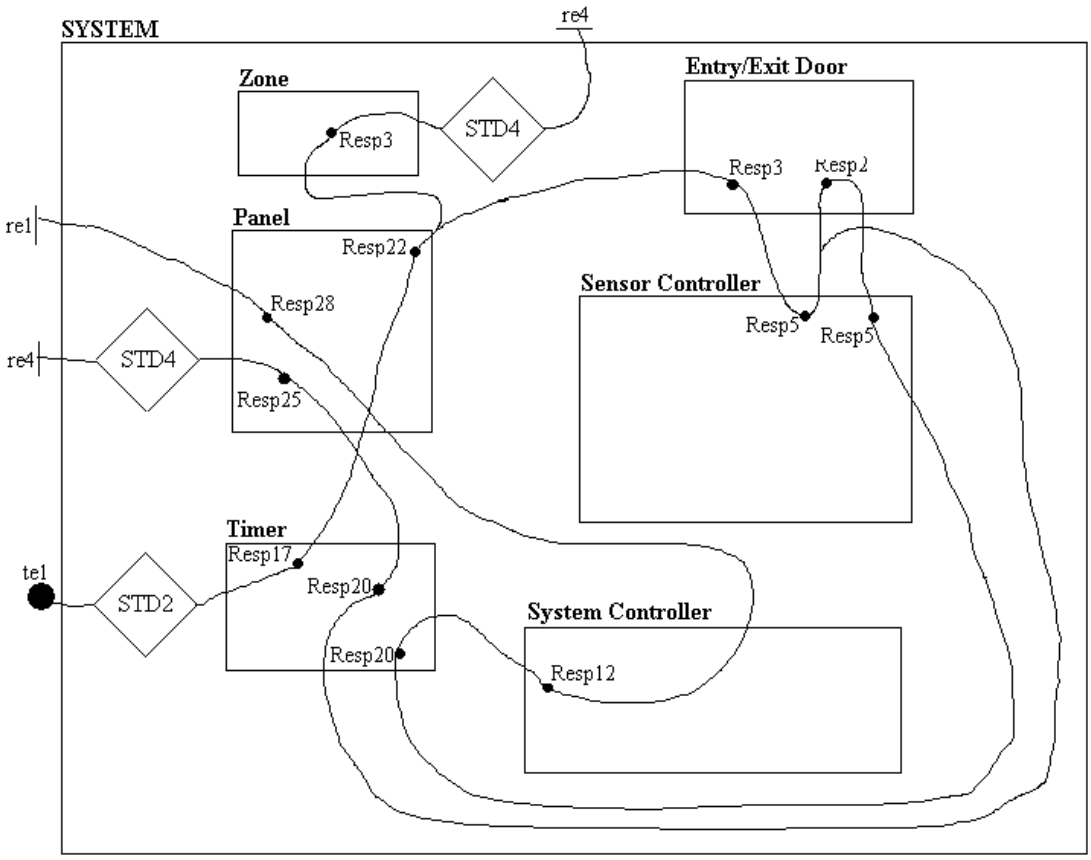
te5	*Smoke detectors detect smoke.*	
re5	*Interface indicates the system is ready.*	
RespID	**RESPONSIBILITIES**	***STD STEPS***
Resp6	System resets fire sensors	(STD5,5) , (STD5,6) , (STD5,5.1)
Resp7	System's fire sensors detects smoke	(STD5,6.1)
Resp10	System starts fire siren	(STD5,2)
Resp11	System stops fire siren	(STD5,4)
Resp14	System verifies user input	(STD5,4) , (STD5,5)
Resp23	Interface retrieves user input	(STD5,4) , (STD5,5)
Resp26	Interface indicates the system is ready	(STD5,7)
Resp29	Interface indicates the system is in fire alarm mode	(STD5,3)

6. STRUCTURAL MODEL

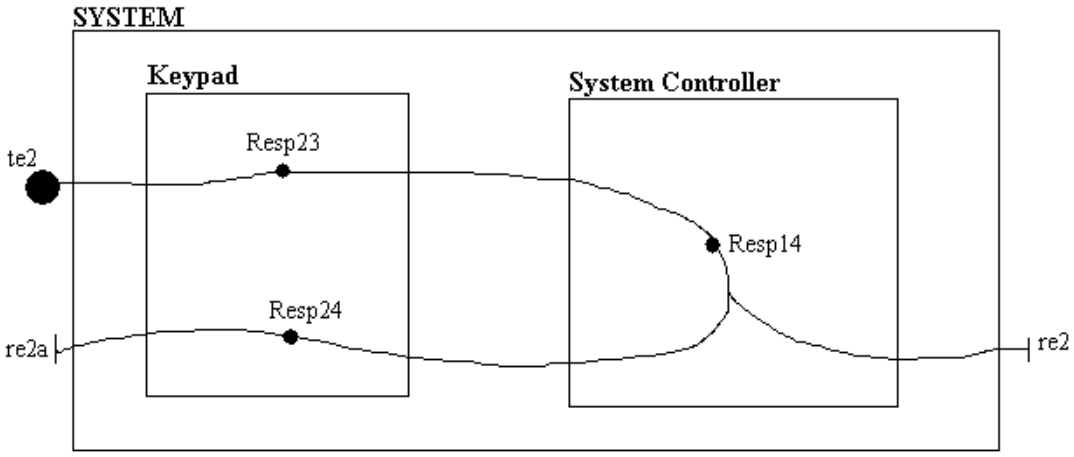


6.1 BOUND USE CASE MAPS

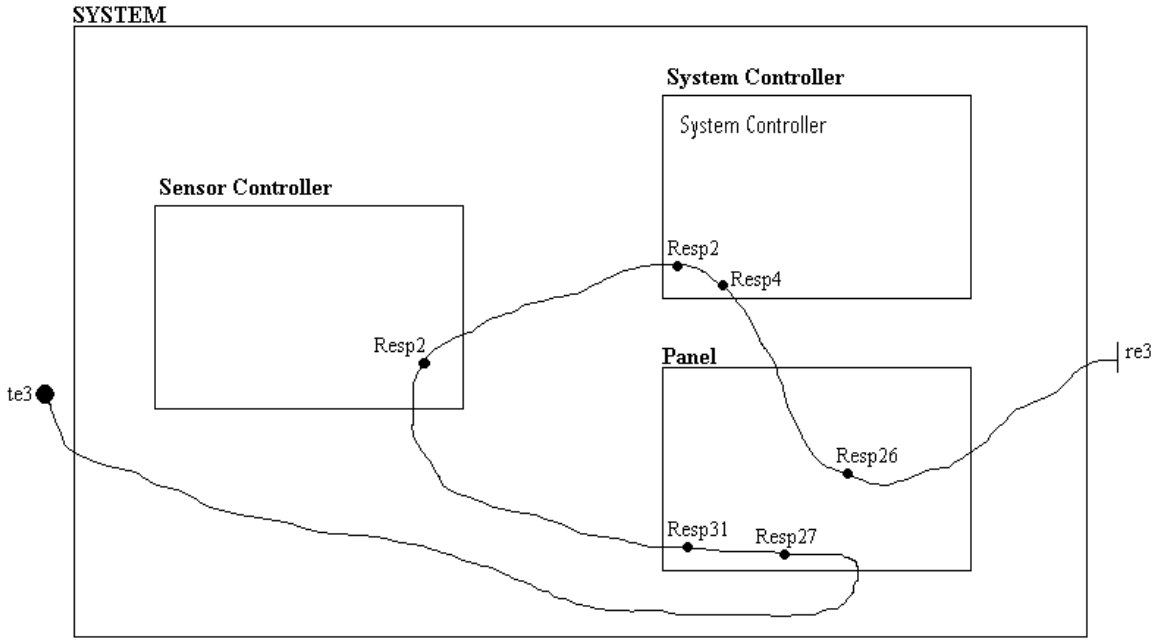
6.1.1 B-UCM1: User Arms the System



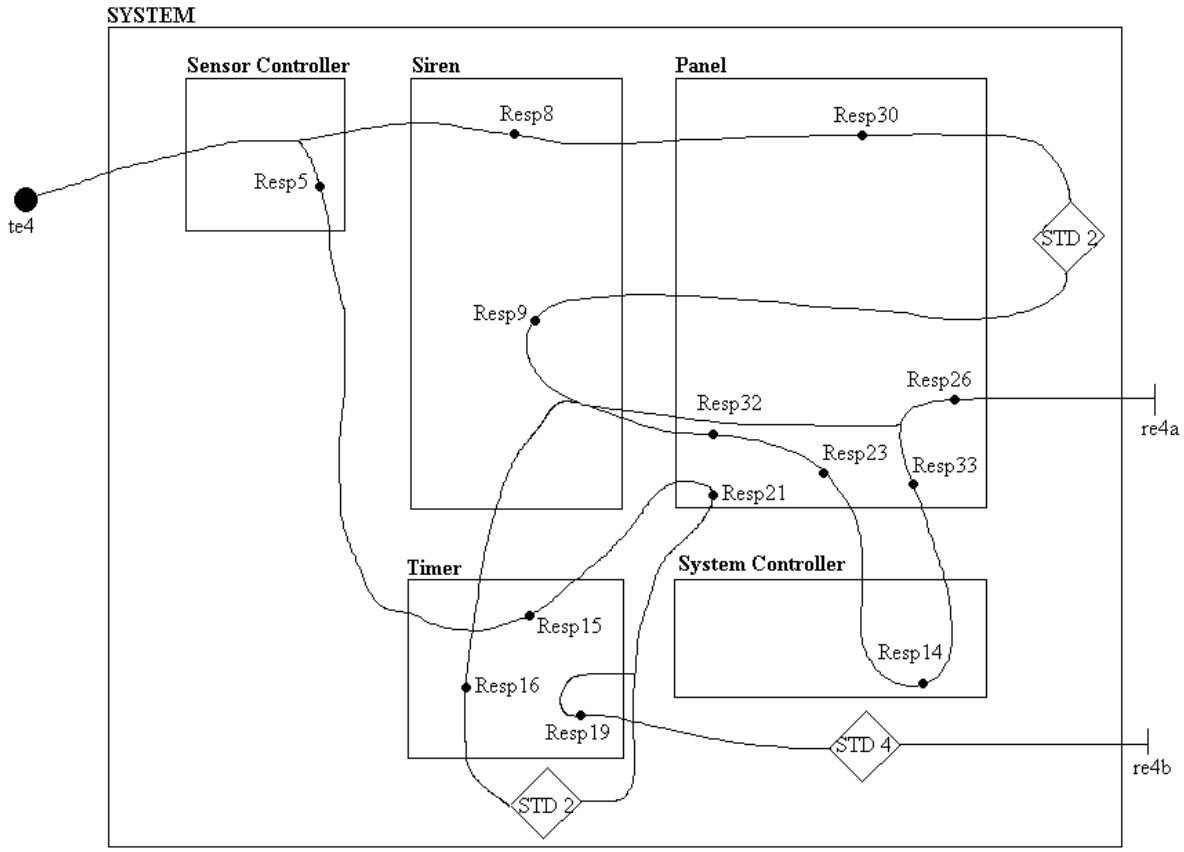
6.1.2 B-UCM2: System Validates User



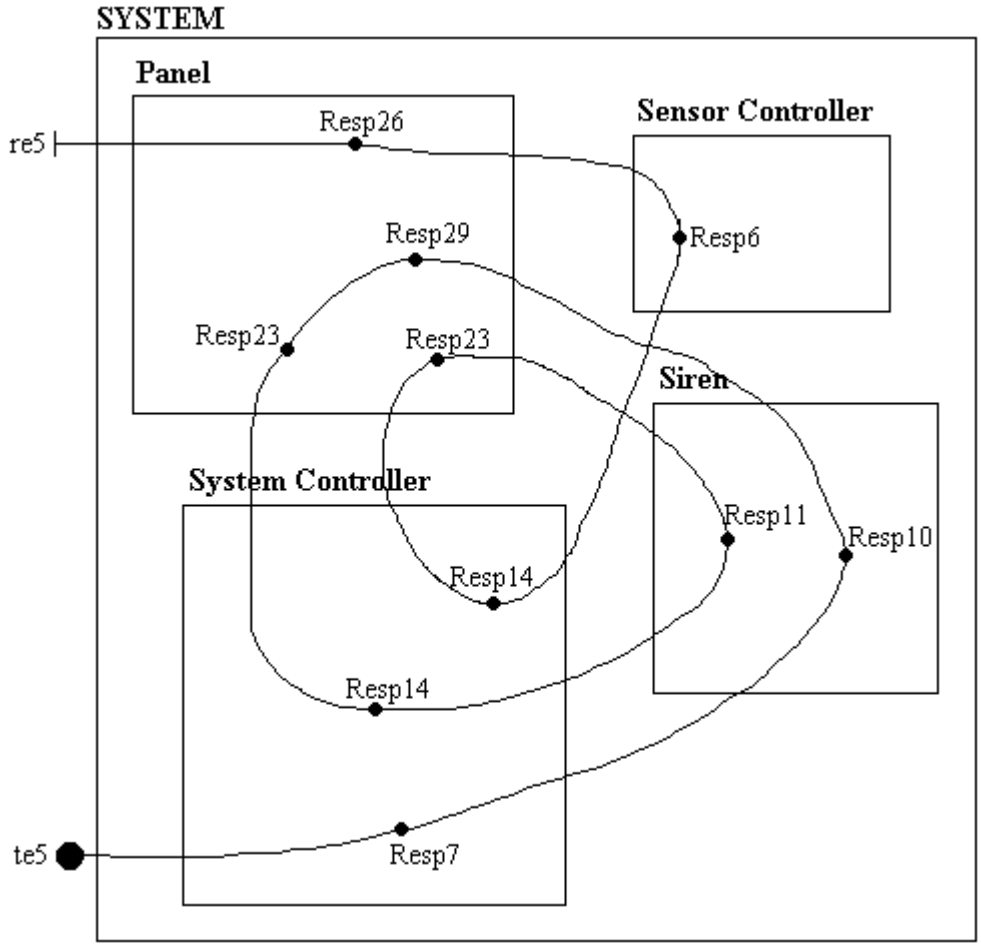
6.1.3 B-UCM3: Intrusion Sensor Triggered in Ready Mode



6.1.4 B-UCM4: Intrusion Alarm / User Disarms the System



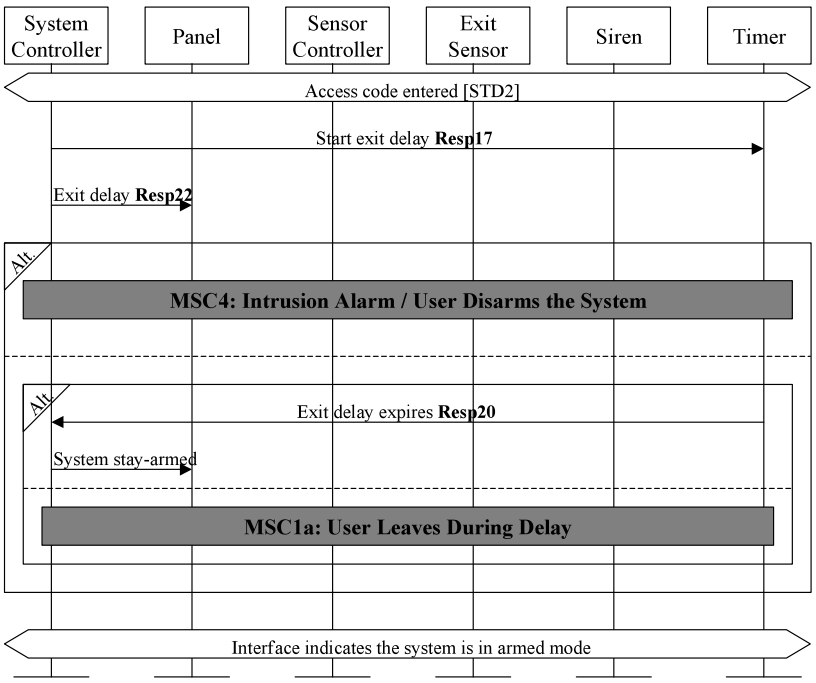
6.1.5 B-UCM5: Fire Alarm Triggered and Reset



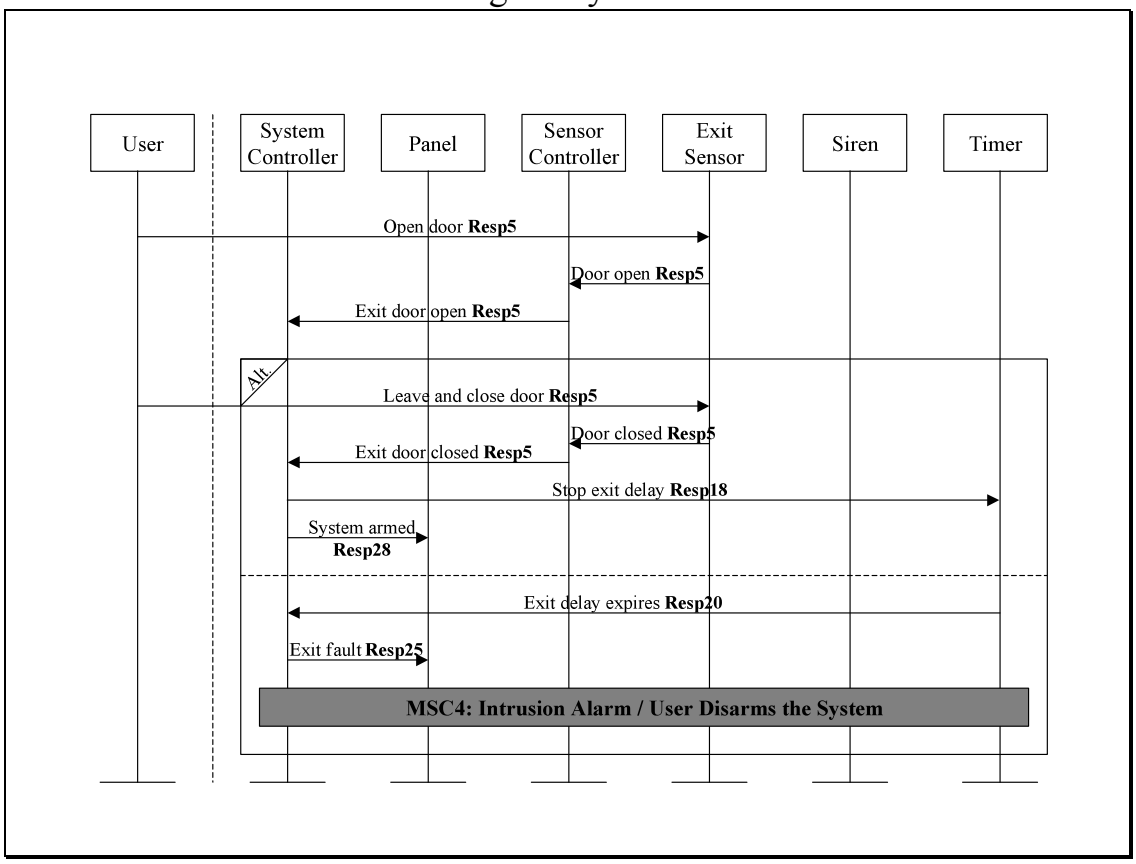
5. MESSAGE SEQUENCE CHARTS

5.1 MSCS

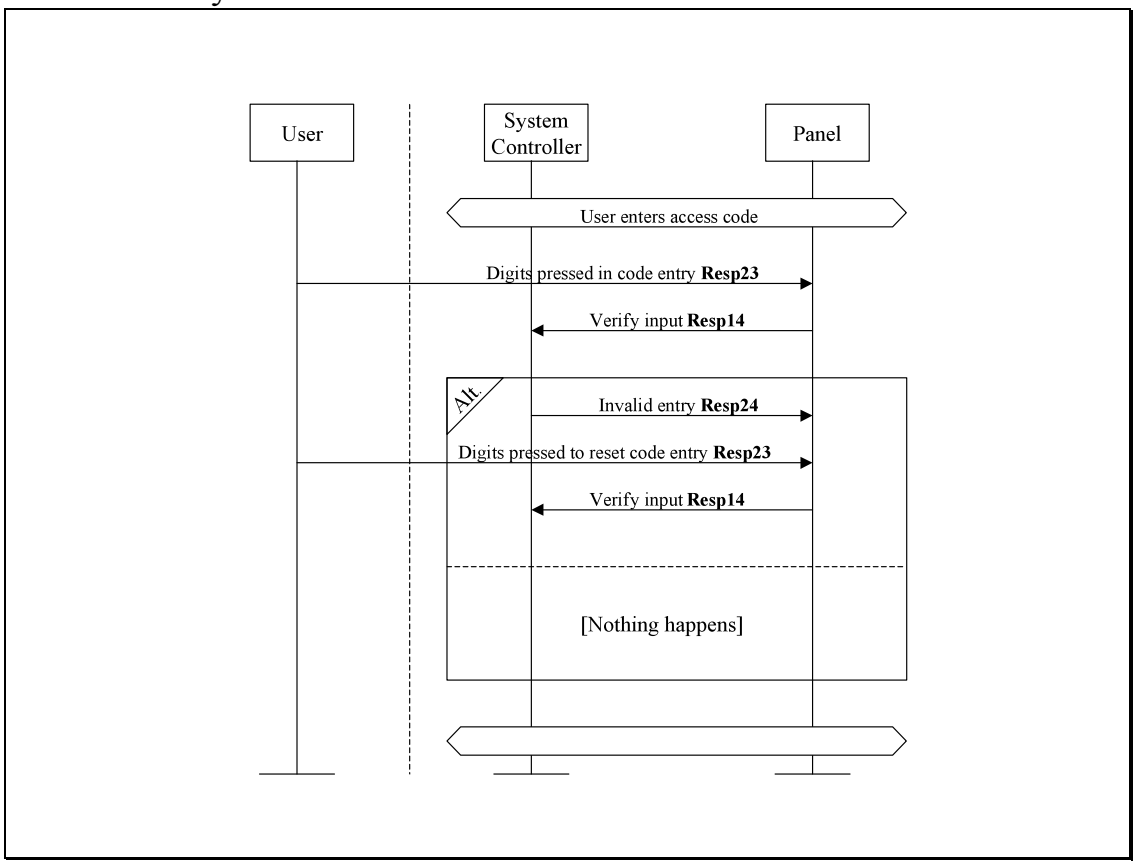
5.1.1 MSC1: User Arms the System



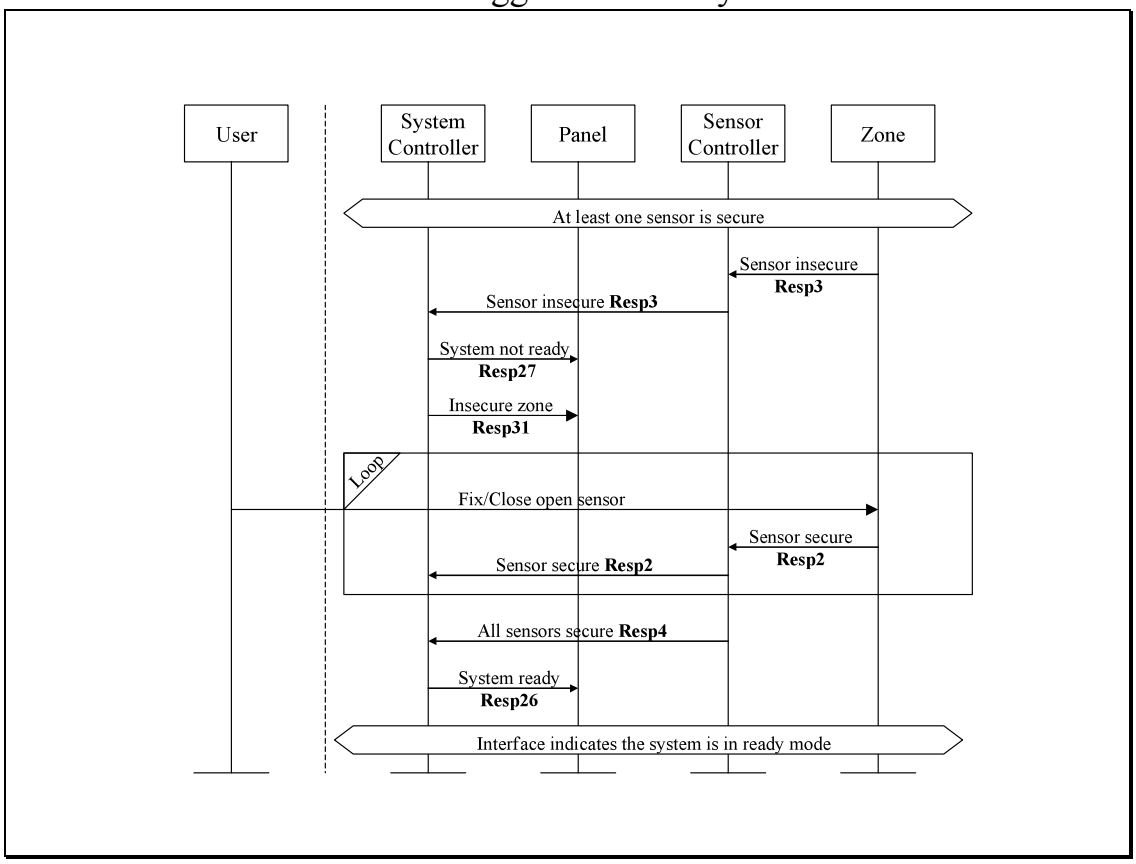
5.1.1 MSC1a: User Leaves During Delay



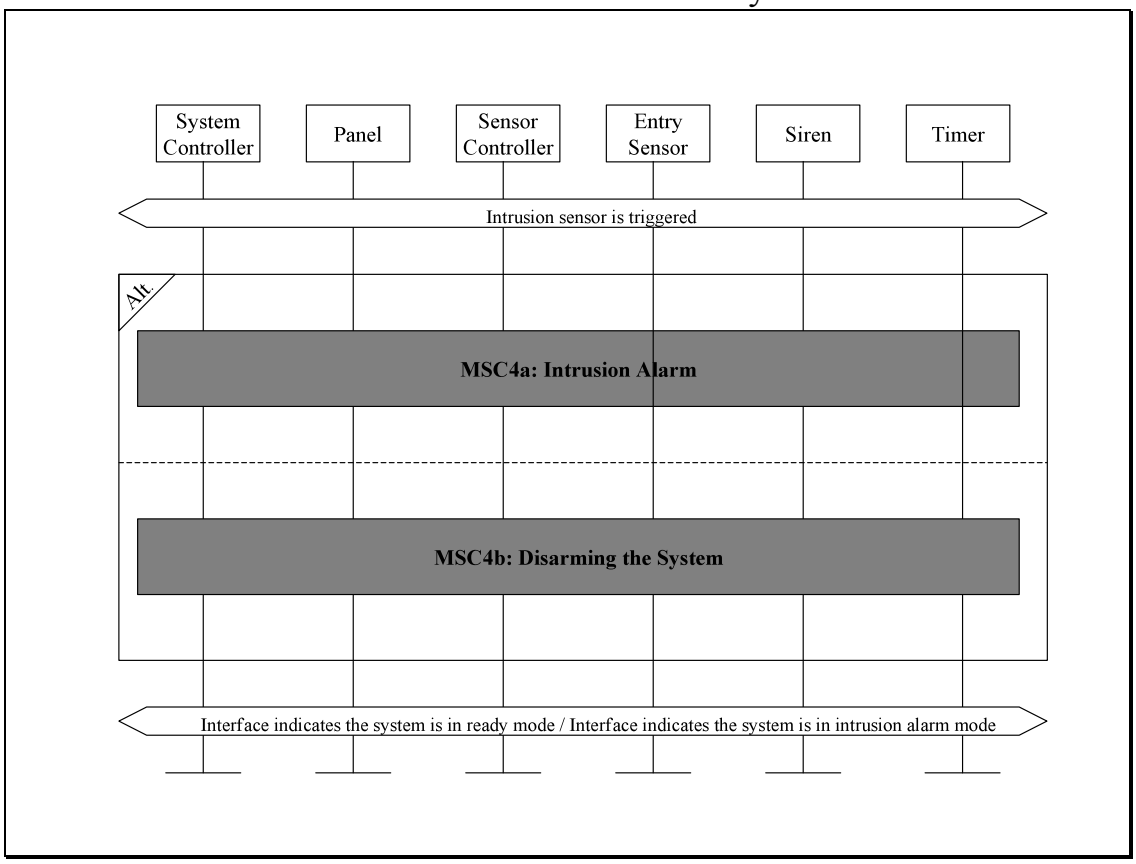
5.1.2 MSC2: System Validates User



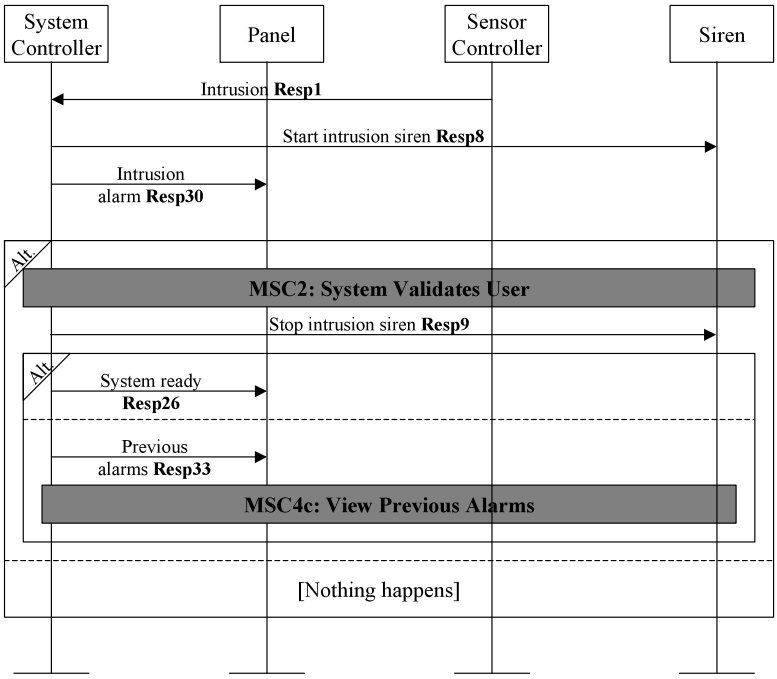
5.1.3 MSC3: Intrusion Sensor Triggered in Ready Mode



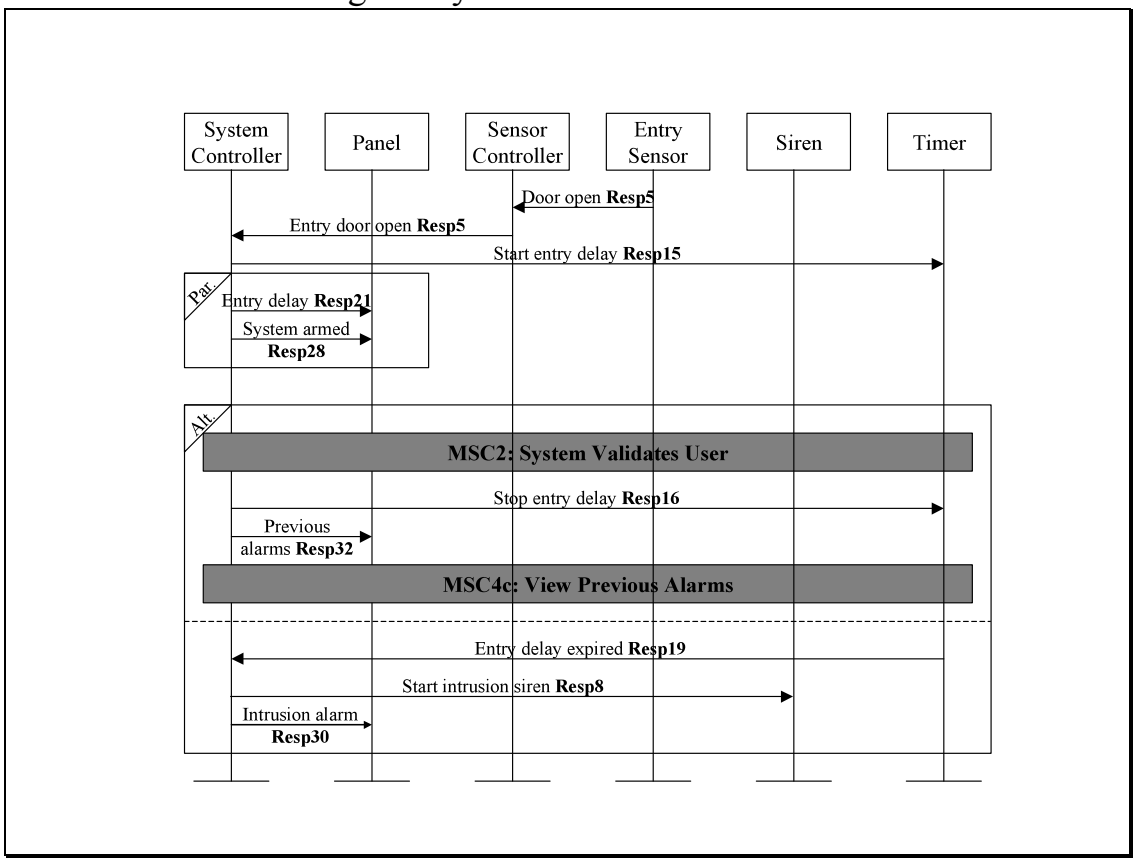
5.1.4 MSC4: Intrusion Alarm / User Disarms the System



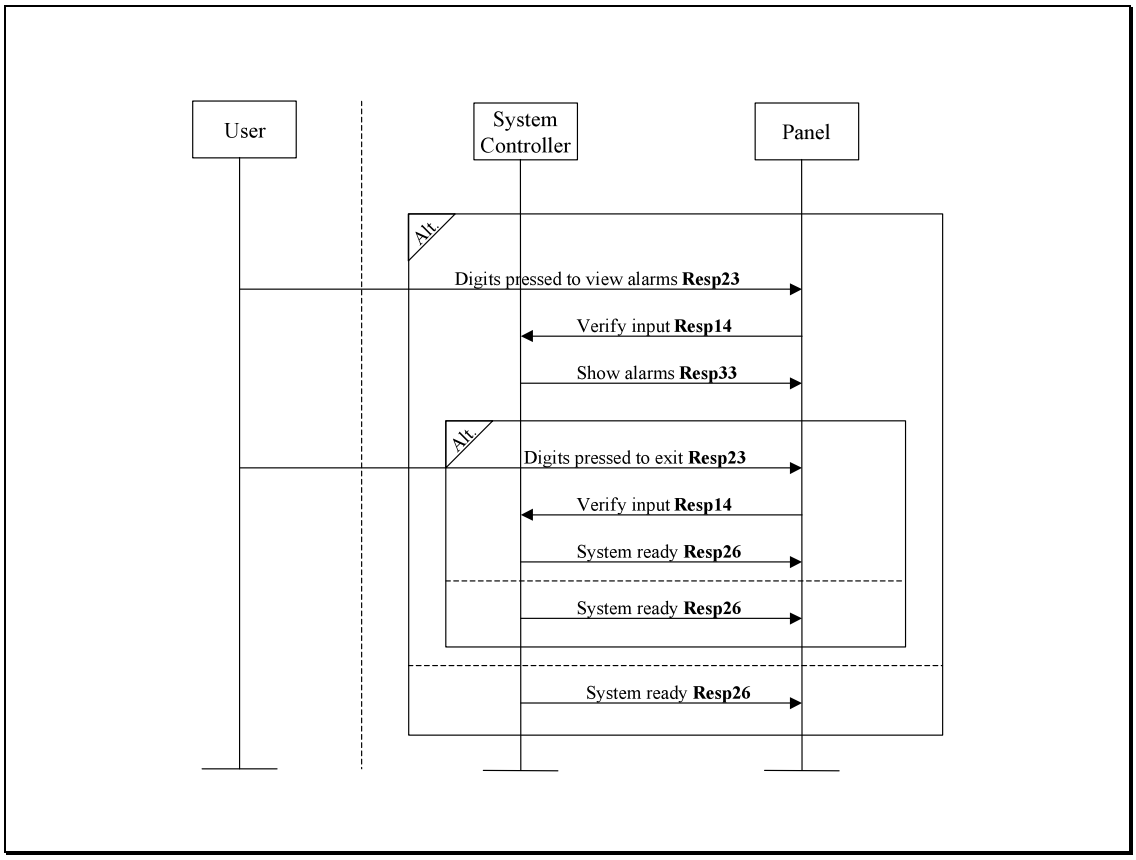
5.1.4 MSC4a: Intrusion Alarm



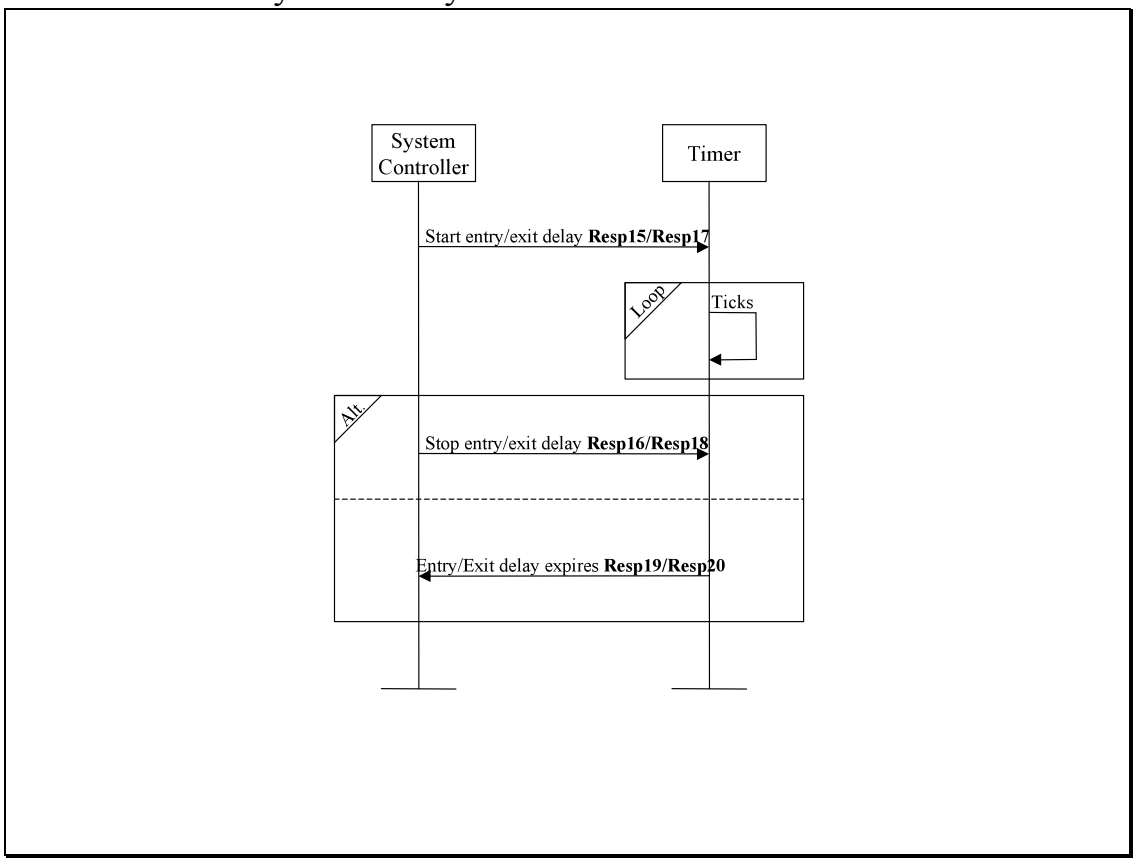
5.1.4 MSC4b: Disarming the System



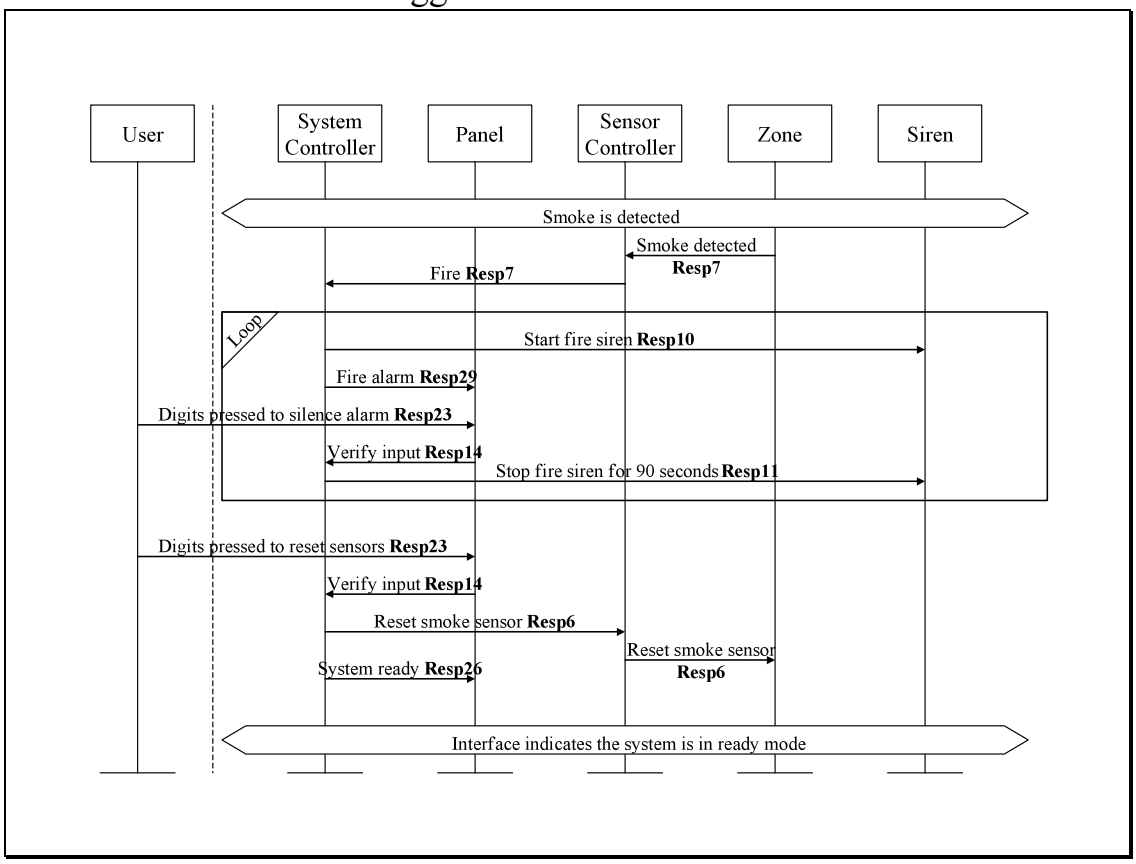
5.1.4 MSC4c: View Previous Alarms



5.1.4 MSC4d: Entry/Exit Delay



5.1.5 MSC5: Fire Alarm Triggered and Reset



7. OBJECT SPECIFICATIONS

7.1 PANEL

NAME	ID	DESCRIPTION	INHERITANCE
Panel	Act-1	This class handles the interface of the system. It acts as the communicator between the user and the system and lets the user know of the system's status. It retrieves user input and passes it to the System Controller for verification.	None

ID	RESPONSIBILITIES	COLLABORATORS	STDS
Resp21	**Interface indicates the system is in entry delay**	System Controller, Timer	(STD4.1.1)
Resp22	Interface indicates the system is in exit delay	System Controller, Timer	(STD1,2)
Resp23	**Interface retrieves user input**		(STD2,2) , (STD2,2.1) , (STD4,4) , (STD4,7) , (STD4,9) , (STD4,1.1.2), (STD5,4) , (STD5,5)
Resp24	Interface indicates incorrect access code entered	System Controller	(STD2,2.1)
Resp25	Interface indicates exit error (exit fault)	System Controller, Timer	(STD1,3.2)
Resp26	Interface indicates the system is ready	System Controller, Sensor Controller, Zones	(STD3,7) , (STD4,11) , (STD5,7)
Resp27	Interface indicates the system is not ready	System Controller, Sensor Controller, Zones	(STD3,2)
Resp28	Interface indicates the system is armed	System Controller	(STD1,6)
Resp29	Interface indicates the system is in fire alarm mode	Fire Sensor, Zones, Sensor Controller, System Controller	(STD5,3)
Resp30	Interface indicates the system is in intrusion alarm mode	Intrusion Sensor, Zones, Sensor Controller, System Controller	(STD4,3)
Resp31	Interface indicates zones with insecure sensor(s)	Zones, Sensor Controller, System Controller	(STD3,3)

Resp32	Interface displays previous alarms	System Controller	(STD4,6)
Resp33	Interface displays the list of zones in which previous alarms occurred.	System Controller	(STD4,8)

DATA MEMBER DICTIONARY

VARIABLE NAME	TYPE	STATUS	PROCEDURES
lastDisplay	RTMessage	Read/Write	

PROCEDURE DICTIONARY

PROCEDURE NAME	RETURN TYPE	PARAMETER NAME	PARAMETER TYPE	RESPONSIBILITIES
9 There are no Procedures for this Class				

7.2 SYSTEM CONTROLLER

NAME	ID	DESCRIPTION	INHERITANCE
System Controller	Act-2	The main part of the system, this class handles much of the communication between the various objects within. It also handles the verification of the user input, determining and deciphering what the user wants and what action the system must take.	None

ID	RESPONSIBILITIES	COLLABORATORS	STDS
Resp1	**System's intrusion sensors detects intrusion**	**Intrusion Sensor, Sensor Controller, Zones**	(STD1,4.1) , (STD3,5.1)
Resp2	**System recognizes secure sensors**	Zones, Sensor Controller	(STD3,3) , (STD3,5)
Resp3	**System recognizes insecure sensors**	Zones, Sensor Controller	(STD1,3.2) , (STD1,4.1), (STD3,5.1)
Resp4	**System recognizes all sensors secure**	Zones, Sensor Controller	(STD3,5)
Resp5	**System differentiates the entry/exit sensor from other sensors**	Sensor Controller, Zones	(STD1,3) , (STD1,3.1) , (STD1,3.2) , (STD4,1.1.1)
Resp6	**System resets fire sensors**	Sensor Controller, Zones, Fire Sensor	(STD5,5) , (STD5,5.1)

Resp7	**System's fire sensors detects smoke**	Zones, Sensor Controller, System Controller, Fire Sensor	(STD5,6.1)
Resp8	**System starts intrusion siren**	Siren	(STD4,2) , (STD1,3.2)
Resp9	System stops intrusion siren	Siren	(STD4,5)
Resp10	System starts fire siren	Siren	(STD5,2)
Resp11	System stops fire siren	Siren	(STD5,4)
Resp12	System arms intrusion sensors	Sensor Controller, Zones, Intrusion Sensor	(STD1,1)
Resp13	System disarms intrusion sensors	Sensor Controller, Zones, Intrusion Sensor	(STD4,4)

ID	RESPONSIBILITIES	COLLABORATORS	STDS
Resp14	System verifies user input	Panel	(STD2,2) , (STD2,2.1) , (STD4,4) , (STD4,7) , (STD4,9) , (STD4,1.1.2), (STD5,4), (STD5,5)
Resp15	System starts entry delay timer	Timer	(STD4,1.1.1)
Resp16	System stops entry delay timer	Timer	(STD4,1.1.3)
Resp17	System starts exit delay timer	Timer	(STD1,1)
Resp18	System stops exit delay timer	Timer	(STD1,3)
Resp19	System detects entry delay expired	Timer	(STD4,1.2.1)
Resp20	System detects exit delay expired	Timer	(STD1,4)

DATA MEMBER DICTIONARY

VARIABLE NAME	TYPE	STATUS	PROCEDURES
accessCode	Integer	ReadOnly	
isSystemSecure	Boolean	Read/Write	
alarmZone	Integer	Read/Write	

PROCEDURE DICTIONARY

PROCEDURE NAME	RETURN TYPE	PARAMETER NAME	PARAMETER TYPE	RESPONSIBILITIES
10 There are no Procedures for this Class				

7.3 SIREN

NAME	ID	DESCRIPTION	INHERITANCE
Siren	Act-3	This class has the function of producing sounds as instructed. Two types of sounds are created: a pulsing siren and a continuous siren.	None

ID	RESPONSIBILITIES	COLLABORATORS	STDS
Resp8	**System starts intrusion siren**	System Controller	(STD4,2) , (STD1,3.2)

Resp9	System stops intrusion siren	System Controller	(STD4,5)
Resp10	System starts fire siren	System Controller	(STD5,2)
Resp11	System stops fire siren	System Controller	(STD5,4)

DATA MEMBER DICTIONARY

VARIABLE NAME	TYPE	STATUS	PROCEDURES
11 There are no Variables for this Class			

PROCEDURE DICTIONARY

PROCEDURE NAME	RETURN TYPE	PARAMETER NAME	PARAMETER TYPE	RESPONSIBILITIES
12 There are no Procedures for this Class				

7.4 TIMER

NAME	ID	DESCRIPTION	INHERITANCE
Timer	Act-4	This class supplies time limits for the System Controller. It operates under the instructions of the System Controller and informs the System Controller of expired time limits.	None

ID	RESPONSIBILITIES	COLLABORATORS	STDS
Resp15	System starts entry delay timer	System Controller	(STD4,1.1.1)
Resp16	System stops entry delay timer	System Controller	(STD4,1.1.3)
Resp17	System starts exit delay timer	System Controller	(STD1,1)
Resp18	System stops exit delay timer	System Controller	(STD1,3)
Resp19	System detects entry delay expired	System Controller	(STD4,1.2.1)
Resp20	System detects exit delay expired	System Controller	(STD1,4)

DATA MEMBER DICTIONARY

VARIABLE NAME	TYPE	STATUS	PROCEDURES
entryDelay	Integer	ReadOnly	
exitDelay	Integer	ReadOnly	

PROCEDURE DICTIONARY

PROCEDURE NAME	RETURN TYPE	PARAMETER NAME	PARAMETER TYPE	RESPONSIBILITIES

13 There are no Procedures for this Class

7.5 SENSOR CONTROLLER

NAME	ID	DESCRIPTION	INHERITANCE
Sensor Controller	Act-5	This class keeps track of each zone's sensors (intrusion and fire) as well as the Entry/Exit Door Sensor. It communicates with the System Controller with regards to activities that have occurred within the zones.	None

ID	RESPONSIBILITIES	COLLABORATORS	STDS
Resp1	**System's intrusion sensors detects intrusion**	**Intrusion Sensor, Zones, System Controller**	(STD1,4.1) , (STD3,5.1)
Resp2	**System recognizes secure sensors**	Zones, System Controller	(STD3,3) , (STD3,5)
Resp3	**System recognizes insecure sensors**	Zones, System Controller	(STD1,3.2) , (STD1,4.1), (STD3,5.1)
Resp4	**System recognizes all sensors secure**	Zones, System Controller	(STD3,5)
Resp5	**System differentiates the entry/exit sensor from other sensors**	Zones, System Controller	(STD1,3) , (STD1,3.1) , (STD1,3.2) , (STD4,1.1.1)
Resp6	**System resets fire sensors**	Zones, Fire Sensor, System Controller	(STD5,5) , (STD5,5.1)
Resp7	**System detects fire**	Zones, System Controller, Fire Sensor	(STD5,6.1)
Resp8	System arms intrusion sensors	System Controller, Zones, Intrusion Sensor	(STD1,1)
Resp9	System disarms intrusion sensors	System Controller, Zones, Intrusion Sensor	(STD4,4)

DATA MEMBER DICTIONARY

VARIABLE NAME	TYPE	STATUS	PROCEDURES
14 There are no Variables for this Class			

PROCEDURE DICTIONARY

PROCEDURE NAME	RETURN TYPE	PARAMETER NAME	PARAMETER TYPE	RESPONSIBILITIES
15 There are no Procedures for this Class				

7.6 ENTRY/EXIT SENSOR

NAME	ID	DESCRIPTION	INHERITANCE
Exit/Entry Sensor	Act-6	This class monitors the status of the Entry/Exit Door. It informs the Sensor Controller of this status.	None

ID	RESPONSIBILITIES	COLLABORATORS	STDS
Resp1	**System's intrusion sensors detects intrusion**	**Zones, System Controller, System Controller**	(STD1,4.1) , (STD3,5.1)

DATA MEMBER DICTIONARY

VARIABLE NAME	TYPE	STATUS	PROCEDURES
16 There are no Variables for this Class			

PROCEDURE DICTIONARY

PROCEDURE NAME	RETURN TYPE	PARAMETER NAME	PARAMETER TYPE	RESPONSIBILITIES
17 There are no Procedures for this Class				

7.7 ZONES

NAME	ID	DESCRIPTION	INHERITANCE
Zones	Act-7	This class acts as a container for the Intrusion Sensors and the Fire Sensors. It is told when to arm or disarm its sensors. Also, it informs the Sensor Controller of any activities detected by its sensors.	None

ID	RESPONSIBILITIES	COLLABORATORS	STDS
Resp1	**System's intrusion sensors detects intrusion**	**Intrusion Sensor, System Controller, Sensor Controller**	(STD1,4.1) , (STD3,5.1)
Resp7	**System's fire sensors detects smoke**	System Controller, Fire Sensor, Sensor Controller	(STD5,6.1)

DATA MEMBER DICTIONARY

VARIABLE NAME	TYPE	STATUS	PROCEDURES
18 There are no Variables for this Class			

PROCEDURE DICTIONARY

PROCEDURE NAME	RETURN TYPE	PARAMETER NAME	PARAMETER TYPE	RESPONSIBILITIES

19 There are no Procedures for this Class

7.8 INTRUSION SENSORS

NAME	ID	DESCRIPTION	INHERITANCE
Intrusion Sensor	Act-8	This class detects intrusions within its Zone.	None

ID	RESPONSIBILITIES	COLLABORATORS	STDS
Resp1	**System's intrusion sensors detects intrusion**	**System Controller, Sensor Controller, Zones**	(STD1,4.1) , (STD3,5.1)

DATA MEMBER DICTIONARY

VARIABLE NAME	TYPE	STATUS	PROCEDURES
20 There are no Variables for this Class			

PROCEDURE DICTIONARY

PROCEDURE NAME	RETURN TYPE	PARAMETER NAME	PARAMETER TYPE	RESPONSIBILITIES
21 There are no Procedures for this Class				

7.9 FIRE SENSORS

NAME	ID	DESCRIPTION	INHERITANCE
Fire Sensor	Act-9	This class detects smoke within its Zone.	None

ID	RESPONSIBILITIES	COLLABORATORS	STDS
Resp7	**System's fire sensors detects smoke**	System Controller, Zones, Sensor Controller	(STD5,6.1)

DATA MEMBER DICTIONARY

VARIABLE NAME	TYPE	STATUS	PROCEDURES
22 There are no Variables for this Class			

PROCEDURE DICTIONARY

PROCEDURE NAME	RETURN TYPE	PARAMETER NAME	PARAMETER TYPE	RESPONSIBILITIES
23 There are no Procedures for this Class				