CECS 543 – Advanced Software Engineering

Assignment 1

Mentor: Prof. Arjang Fahim

Student Name:

1. **Aishwarya Vivek Bhavsar (*029371509*)**
2. **Navani Atul Udgaonkar (*029370807*)**

TASK 1:

Use Case Descriptions:

Use Case #1: Issue Fire Alarm

ID	UC1
Name	Issue Fire Alarm
Description	Process signals from smoke and heat sensor and alarm the user.
Pre-condition	1. System must be fully configured. 2. Alarm system and smoke sensor, heat sensors are powered on.
Event Flow	1. Process signal from smoke/heat sensor. 2. Alert the user. 3. If a smoke sensor detects smoke 3 times in one minute, issue a fire alarm and call 911.
Extension Points	1. Smoke Clears: Smoke sensor sends updated information to alarm system. 2. Communication Fails: Unstable network. 3. Audible alarm damaged. 4. Authorities cannot be reached. Call backup number.
Triggers	Fire System such as Smoke sensor and Fire sensor detects smoke.
Post-condition	1. Alerts the user. 2. Call 911 in case of emergency.

Use Case #2: Issue Burglar Alarm

ID	UC2
Name	Issue Burglar Alarm
Description	Process signals from motion, door, window sensor and captures the real time image from CCTV surveillance camera and alarms the user.
Pre-condition	1. The system must be fully configured. 2. The alarm system is on and set to a monitoring mode.
Event Flow	1. Movements detected. 2. The real time image is captured after detecting the motion. 3. The captured image is then sent to the homeowner(user). 4. Accordingly, the homeowner(user) will decide whether there is a potential threat or not. 5. If everything looks normal, the sensors are reset by the user. 6. If not call 911
Extension Points	1. If a specific threshold is not reached, intrusion events are discarded. 2. Communication link to alarm severed: Alarm realizes severed link and triggers alarm. 3. Audible alarm damaged: Event locked. 4. If the system is disarmed, an audible alarm is stopped. 5. Authorities cannot be reached: Call backup number. 6. If the system is disarmed, authorities are notified of false alarms.
Triggers	Motion sensors detect intrusion.
Post-condition	1. Alerts the user. 2. Call 911 in case of emergency.

Use Case #3: Issue Flood Alarm

ID	UC3
Name	Issue Flood Alarm
Description	The water sensor has 3 water levels, and the system will notify the homeowner(user) about the respective water levels by sending a code.
Pre-condition	1. System must be fully configured. 2. Always keep the flood alarm power on. Sensors should be placed in areas like bathrooms, basements, kitchen sinks, water heaters, toilets, under the washing machine, refrigerator, dishwasher.
Event Flow	1. The water sensors detect water leaks. 2. Based on water levels as low, medium and high, the respective water level code is sent to the user. 3. The user decides whether to reset the alarm or not. 4. If the water level is high, directly notify the user and ring the alarm and call 911.
Extension Points	1. Sensors not detecting the water level properly 2. False alarm notification of water level
Triggers	Water sensors detect water at certain level.
Post-condition	3. Alerts the user. 4. Call 911 in case of emergency.

Use Case #4: Authenticate User

ID	UC4
Name	Authenticate User.
Description	Verifies the credential.
Pre-condition	Alarm system is powered on.
Event Flow	1. The system validates the actor's password. 2. Logs him/her into the system.
Extension Points	No code entered: System prompts users to enter code again.
Triggers	Change in alarm system setting desired.
Post-condition	If the credentials get verified, the user can login otherwise an error is displayed.

Use Case #5: Activate the sensors

ID	UC5
Name	Activate the sensors.
Description	User activates the sensors except for water sensors and smoke sensors.
Pre-condition	Authenticate the credentials.
Event Flow	1. User enters credentials. 2. Credentials get verified. 3. User will activate the desired sensors at any time of the day.
Extension Points	1. Damage to Sensor. 2. Sensor will not get activated by the user. 3. Sensor not connected to the network.
Triggers	User requirement.
Post-condition	Sensors are activated and the respective system will start working.

Use Case #6: Deactivate the sensors

ID	UC6
Name	Deactivate the sensors.
Description	User has authority to deactivate the sensor.
Pre-condition	Sensors should be active.
Event Flow	1. User deactivates the sensor as per timely needs. 2. User can only deactivate door, window and movement sensors.
Extension Points	1. User unable to deactivate the sensor. 2. Sensor not connected to the network. 3. Damage to sensor.
Triggers	User requirement.
Post-condition	Sensor stops working.

Use Case #7: 911 Authorities

ID	UC7
Name	911 Authorities.
Description	The 911 authorities respond the call from the system or homeowner.
Pre-condition	Call will be directed when emergency is detected.
Event Flow	1. When emergency is detected by a sensor, the system will notify the user as well as 911. 2. Similarly, the user could also directly call/notify 911 in case of emergency.
Extension Points	When sensor unable to detect emergency.
Triggers	High risk emergency.
Post-condition	The authorities respond the call and take immediate action.

Use Case #8: Reset the sensor

ID	UC8
Name	Reset the sensor.
Description	Homeowner stops the sensor using the keypad.
Pre-condition	1. Heat sensor is functional. 2. Smoke sensor indicates 3 smokes in 1 minute. 3. Homeowner accesses the system from the keypad.
Event Flow	1. Homeowner inputs code to reset the fire alarm. 2. Fire alarm is reset.
Extension Points	Homeowner unable to reset the sensor due to unstable network connection.
Triggers	Heat sensor is set off and or smoke sensor set off 3 times in 1 minute.
Post-condition	Fire alarm stops.

Use Case #9: System Codes

ID	UC9
Name	System Codes
Description	Every alarm system has a particular code with which it will notify the user.
Pre-condition	1. When sensors are active. 2. When emergency is detected.
Event Flow	1. For Fire Alarm System, the system will notify the user with code, “SMOKE/FIRE”. 2. For Burglar Alarm System, the system will notify the user with code, “TRESPASSING” when movement detected and with code, “BREAK IN” when doors and windows are unlocked. 3. For Flood Alarm System, the system will notify the user with code, “WATER: LOW”, “WATER: MED”, “WATER-HIGH”.
Extension Points	System unable to send the user codes.
Triggers	When emergency detected by sensors.
Post-condition	User will reset the sensor to normal status or will call emergency.

Use Case #10: Check sensor’s status

ID	UC10
Name	Status of Sensors
Description	The sensors should either be active or de-active.
Pre-condition	User should be logged in into the system.
Event Flow	1. User logs in into the system. 2. User checks the status of the sensors. 3. Sensor’s status can be active or de-active.
Extension Points	Unable to show the status.
Triggers	User requirement.
Post-condition	1. User gets information about the status of the sensors. 2. User is free to log off from the system.

Task 2:

Non-Functional requirements:

ID	NF1
Name	Material Check – Explosive/Poisonous
Type of Requirement	Environmental
Criteria	The hardware that we will be using in the alarm sensors should be eco-friendly.
Test	Green Product Mark Certification

ID	NF2
Name	Accommodate maximum devices
Type of Requirement	Capacity
Criteria	The system should be able to connect to N number of devices and should work smoothly.
Test	Using software tools like Apache JMeter for load, performance testing.

ID	NF3
Name	Reset Credentials
Type of Requirement	Security
Criteria	Users must change the initially assigned login password immediately after the first successful login. Moreover, the initial should never be reused.
Test	Multifactor Authentication using a push or passcode option available to the user.

ID	NF4
Name	Portable on different platforms
Type of Requirement	Interoperability
Criteria	The ability of the system to run on different operating environments and with different components.
Test	OData Service Validation Tool

ID	NF5
Name	Recovery Of Alarm Systems
Type of Requirement	Recoverability
Criteria	Ability of the alarm systems to recover itself when it fails or unable to perform satisfactorily.
Test	Box Backup, Bacula – to keep the backup of the data.