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Assignment 3

***Use Case Model for Elevator Usage***

**Use Case 1: Elevator Call and Boarding.**

**Actor:** A person who requires the service of the elevator.

**Pre-condition**: The elevator works properly, and the person knows how to operate an elevator.

**Main Success Scenario:**

1. Person presses the elevator calling button (up or down).
2. Button lights up to show input registration.
3. Elevator arrives, the bell rings, and the doors open.
4. Person boards the elevator.

**Post-condition:** The person reaches their destination floor successfully.

**Use Case 2: Floor Selection.**

**Actor:** A person who requires the service of the elevator.

**Pre-condition**: the person is inside the elevator and knows how to operate an elevator.

**Main Success Scenario:**

1. The person presses the floor button.
2. The button illuminates.
3. The elevator door closes after ringing a bell.

**Extensions:**

1a. The user presses help button at some point.

1a1. The passenger is connected to building safety service through a

voice connection.

1a2. If there is no response from building safety within 5 seconds or if there is no response from a passenger a 911 emergency call is placed.

3a. The light sensor is interrupted when the door is closing.

3a1. The door opens.

3b. The light sensor is interrupted constantly.

3b1.Warning is sounded, and a message is displayed.

3c. The passenger or cargo load exceeds the carrying capacity and the bells doesn’t ring.

3c1. The elevator does not move, and an audio and a message are presented to passengers asking for the load to be reduced before attempting to move again.

**Post-condition**: The elevator heads towards destination.

**Use Case 3: Arrival at destination and deboarding.**

**Actor:** A person who requires the service of the elevator.

**Pre-condition**: The Person is in the elevator and has chosen the destination floor.

**Main Success Scenarios**:

1. The elevator proceeds to the destination floor after the button is pressed.
2. Elevator arrives at destination floor.
3. Doors open and person exits.

**Extensions:**

1a. The control system receives a “Fire” alarm signal from the building.

1a1. System commands all elevators to move to a safe floor.

1a2. an audio and message are presented to passengers about the emergency and asking them to disembark once the safe floor is reached.

1b. There is a power outage.

1b1. An audio and a message are presented to passengers informing them of the power outage.

1b2. The elevator is then moved to a safe floor and passengers are asked to disembark.

**Post-condition**: The person reaches the desired floor and exits the elevator.

**A diagram of a person

Description automatically generated**

Main Success Scenarios:

**1. Two people board on the different floor and want to go to a floor in the same direction.**

1. Person A calls the Elevator by pressing the “up” Elevator Call button from floor 2.
2. Button in the panel illuminates.
3. Elevator Arrives
4. Elevator opens and the bell rings.
5. The passenger boards.
6. Person A presses the button for their destination floor 3.
7. Person B calls the Elevator by pressing the “up” Elevator Call button from floor 3.
8. Person B presses the button for their destination floor 4.
9. The bell rings and the elevator doors close.
10. Elevator moves towards the destination floors stopping when necessary.
11. Elevator opens and the bell rings.
12. Person deboards

**2. Two people board on the different floors and must go to in the different direction.**

1. Person calls the elevator using up button and the button in the panel illuminates in floor 2.
2. Elevator Arrives
3. Elevator opens and the bell rings.
4. The passenger boards.
5. Person A presses the 4 for their destination floor.
6. The bell rings and the elevator doors close.
7. Elevator moves towards the destination floor.
8. Person A deboards
9. Person B calls the elevator from floor 3.
10. Steps 2 to 4 occur again.
11. Person B presses the 2 for their destination floor.
12. Steps 6 and 7 occur again.
13. Elevator stops when a destination floor is reached.
14. Elevator opens and the bell rings.
15. Person B deboards.
16. Steps 12 and 13 occur again

**3. Person pushes help signal**.

1. Person calls the elevator and the button in the panel illuminates.
2. Elevator Arrives
3. Elevator opens and the bell rings.
4. The passenger boards.
5. Person A presses the button for their destination floor.
6. The bell rings and the elevator doors close.
7. Elevator moves towards the destination floor.
8. The person pushes help button.
9. Person is connected to building safety service through a voice connection.
   1. If there is no response from building safety within 5 seconds or if there is no response from a passenger a 911 emergency call is placed.
10. Elevator reaches destination floor.
11. Person deboards.

**4. Boarding with door obstacles**

1. Person calls the elevator and the button in the panel illuminates.
2. Elevator Arrives.
3. Elevator opens and the bell rings.
4. The passengers board.
5. The light sensor is interrupted as the door is closing.
6. The control system stops the door from closing and opens it.
   1. If this occurs repeatedly over a short period of time, a warning is sounded over the audio system and a text message is displayed.
7. The bell rings and the elevator doors close.
8. Elevator moves towards the destination floor.
9. Elevator reaches destination floor.
10. Person deboards.

**5. Fire mid journey:**

1. Person calls the elevator and the button in the panel illuminates.
2. Elevator Arrives
3. Elevator opens and the bell rings.
4. The passenger boards.
5. Person A presses the button for their destination floor.
6. The bell rings and the elevator doors close.
7. Elevator moves towards the destination floor.
8. There is a fire, so the control system receives a “Fire” alarm signal from the building.
9. All elevators start to move to a safe floor.
10. An audio and text message are presented to passengers informing them of an emergency and asking them to disembark once the safe floor is reached.
11. A safe floor is reached.
12. Passengers deboard.

**6. Cargo Overload:**

1. Person calls the elevator and the button in the panel illuminates.
2. Elevator Arrives.
3. Elevator opens and the bell rings.
4. The passengers board.
5. Destination floor 2 is selected and doors close.
6. The cargo load exceeds the carrying capacity, so the control system receives an “Overload” alarm signal.
7. An audio and a text message are presented to passengers asking for the load to be reduced before attempting to move.
8. Doors open, the cargo load is reduced and doors close.
9. Elevator moves towards the destination floor.
10. Person deboards.

**7. Power out mid journey:**

1. Person calls the elevator and the button in the panel illuminates.
2. Elevator Arrives
3. Elevator opens and the bell rings.
4. The passenger boards.
5. Person A presses the button for their destination floor.
6. The bell rings and the elevator doors close.
7. Elevator moves towards the destination floor.
8. There is a power outage, so the control system receives a “Power Out” alarm signal from the building.
9. All elevators start to move to a safe floor.
10. An audio and text message are presented to passengers informing them of an emergency and asking them to disembark once the safe floor is reached.
11. A safe floor is reached.
12. Passengers deboard.

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| **ID** | **Requirement** | **Related**  **Use Case** | **Fulfilled by** | **Tested By** | **Description** |
| 1 | Elevator request  Buttons illuminate  when pressed and  remain on until an elevator  arrives. | N/A | ElevatorControlSystem,  MainWindow.ui | When you click  Up or down buttons  On the ui | The class makes sure that the  elevator request buttons  illuminate upon pressing and  remain lit until the elevator  arrives. |
| 2 | Elevators arrives to  target  floor, rings a bell  and opens  doors for 10  seconds upon  arrival. | N/A | ECS, doors,  AudioSystem,  MainWindow.ui | Can be verified  Through the con  -sole when you  Call an elevator. | ECS sends the elevator to the  target floor and the doors  And audioSystem classes  Make the elevator ring a  bell and keeps doors open  for 10 seconds upon  reaching a floor with the use  of a timer. |
| 3 | Inside the elevator,  there are  "open door" and  "close  door" buttons for passengers  to control door  functions. | N/A | ECS,  Doors,  MainWindow.ui | The Ui has the  Buttons on the pan  -el whose output  Can be verified  Thru the console | Resets the 10 second timer  When "open door" button is  Pressed and keeps doors  open and "close door"  button overrides the 10  second timer and closes the  doors prematurely. |
| 4 | Passengers inside  the  elevator can select  destination floors  using a  control panel. | N/A | ECS, MainWIndow.ui | The Ui has an  Elevator panel  Section which can  Be tested with multiple inputs. | Passengers select the  Destination floor with the  gui and the elevator lets it  remain illuminated and  updates the ECS with the  destination floor. |
| 5 | The elevator  displays the  current floor  number and  warning messages  synced  with audio  warnings. | UC2, UC3. | ECS,  displaySystem,  audioSystem.  MainWindow.ui | The emergency  Initiation Buttons  provided  Help test the  emergencies | ECS works with the sensors  to update that the elevator  display to the correct floor  number and displays  appropriate warning  messages with audio  messages, in case of any  emergency. |
| 6 | ­­Elevators have a  help button linked  to building safety  service  Which can also  place a 911  Call, if necessary. | UC2 | Elevator, ECS,  audioSystem,  MainWindow.ui | The elevator panel  In the ui has a help  Button which dem  -onstrates this. | The elevator signals an  Emergency to the ECS and  The ECS uses  the audioSystem controls to  connect to the elevator to  building safety and if theres  no response for 5 seconds, it  places an emergency 911 call. |
| 7 | If the Elevators  sensors detect  obstacles in the  door's path, then  doors stop and  reopen and try to  close again  after a while. | UC2 | Elevator, ECS,  Door,  displaySystem,  audioSystem,  MainWindow.ui | The emergency  Initiation buttons  Provide an obsta  -cle emergency to  test this | The elevator sensors update  the doors and the doors  don’t close until the obstacle  is moved. Incase of  repeated obstacles, a  warning message is played  and displayed. |
| 8 | In case of a "Fire"  alarm signal, all  elevators move to  a safe floor; audio  and text  messages inform passengers  of the emergency. | UC3 | Elevator, ECS,  AudioSystem,  displaySystem,  doors, MainWindow.ui | The emergency  Initiation buttons  Provide a fire  emergency to  test this | ECS sends emergency signals  To all elevators and  elevators move to a safe  floor, and passengers are  informed of the emergency  through audio and text  messages. |
| 9 | In case of an  "Overload"  alarm signal,  elevators do  not move, audio  and text messages  ask passengers to  reduce load before  attempting to move. | UC2 | Elevator, ECS,  AudioSystem,  displaySystem,  doors, MainWindow.ui | The emergency  Initiation buttons  Provide an  overload  emergency to  test this | Elevator detects overload  through the sensors.  Sensors update the ECS.  The ECS sends an emergency  signal to the elevator and the  other systems and an audio  message and a text message  are played. |
| 10 | In case of a  "Power Out"  alarm signal,  elevators  move to a safe floor,  passengers  disembark with instructions via  audio and  text messages. | UC3 | Elevator, ECS,  AudioSystem,  displaySystem,  doors, MainWindow.ui | The emergency  Initiation buttons  Provide a power  out emergency to  test this. | Back up battery kicks in and  the ECS sends emergency  signals to all elevators and  elevators move to a safe  floor, and passengers are  informed of the emergency  through audio and text  messages. |

[Link for YT vid](https://youtu.be/3OHdsrWv430)  
YT vid link in case the hyperlink above doesn’t work: https://youtu.be/3OHdsrWv430